



COAL AGE



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Coal Mining and Water

OWNERS of coal mines in their anxiety to save on operating costs often center their gaze far off when matters of moment are close at hand. *For example*, there is the question of water, which is an everyday problem at eight out of ten mines. Call in the mine manager or superintendent and say to him:

You know how many tons of water are raised at your mine for every ton of coal hoisted.

You also know your cost for power per horsepower per year.

But—

Do you know how much of the total water pumped is surface water which can be prevented from entering your mine?

Do you know the size of stream which, if allowed to run into the mine workings, will give you 10,000 gallons in 24 hours?

Do you know what horsepower is required to pump 10,000 gallons from your mine?

Do you know whether or not the waste water from your power plant is drained safely away, or does it soak into the ground and ultimately enter the mine?

Do you know if the brooks and streams are diverted or carried safely across your broken ground?

Do you know how many little streams of 10,000 gallons per 24 hours you may stop from entering your mine?



IF your manager or superintendent is unable to answer the foregoing questions, he is either "asleep at the switch," or he is a low-power official in a land of many hills. While you are waking him up or hunting for a substitute, GO OVER THE GROUND overlying your mines with your chief engineer, and if you find that you cannot spend some money in drainage, etc., that will pay a larger dividend on each dollar so invested than you are paying to your stockholders, sign your name

COAL OPERATOR UNIQUE.

The Storage of Coal--I

BY JOHN B. C. KERSHAW*

SYNOPSIS—This is the first of three articles on the subject of coal storage. The text of this initial installment deals particularly with the chemical and physical constitution of coal. The author states that the percentage of volatile matter yielded by a fuel is no guide to its inflammability. A method of determining the relative proportions of readily decomposed constituents in different coals is given.

The storage of coal is a subject that has attracted considerable attention in recent years. The dangers that attend any lengthened interference with the mainspring of the national position and wealth or with the supplies of the chief raw material of the transporting and manufacturing industries have been brought home to us in recent years by serious labor disputes and strikes in the coal-mining districts of the world. As a result of these disturbances, it has become a fixed policy on the part of those in charge of railway and transport services, electric-light and power plants, gas-works, water works and all large manufacturing undertakings to carry large stocks of coal, in order to be prepared for any emergencies that may arise.

A great variety of methods and many different types of stock heaps and storage bins have been tried for this purpose. The problem is not as simple as it would be if the material to be stored underwent no physical or chemical changes in the process. Nearly all coals deteriorate rapidly under certain conditions of storage and exposure, and there are the further dangers of heating and spontaneous combustion to which certain classes of coal are specially liable. The problem of coal storage is therefore intimately associated with the chemical constitution of coal and with the changes that occur in it when heated, and the subject cannot be dealt with adequately unless this side of the problem is carefully studied and discussed.

In these articles I intend to approach the subject first from the theoretical and then from the practical standpoint. It is hoped that this discussion of the question of coal storage may prove of value to all who already have large stocks of fuel under their care or who contemplate forming such stock heaps in the near future.

THE CONSTITUTION OF COAL

All naturally occurring solid fuels are modifications of cellulose or woody fiber brought about by great pressure and heat in the strata of the earth's crust. Cellulose, which may be regarded as the raw material of coal, contains carbon, hydrogen and oxygen and is represented by the chemical formula $C_6H_{10}O_5$. It contains 44 per cent. of carbon by weight.

The process of conversion of cellulose into the various classes of solid fuel with which we are familiar has been accompanied by a gradual escape of the hydrogen and oxygen which make up 56 per cent. of its weight and by a gradual increase in the density and hardness of the

product. The following table gives the relative percentages of hydrogen, oxygen, nitrogen and carbon in the more commonly occurring solid fuels found in the earth, and it is interesting to note the gradual increase in the density of the fuel and in the percentage of carbon as one gets deeper and deeper into the bowels of the earth and farther away from the present geological epoch of time.

TABLE 1. SUCCESSIVE STAGES OF CHANGE IN THE FORMATION OF SOLID FUELS

	Carbon, %	Nitrogen and Oxygen, %	Hydrogen, %
Wood (cellulose)	44	50	6
Peat	60	34	6
Brown coal (lignite)	67	27	6
Bituminous coal	85	8	5
Semianthracite or steam coal	88	6	4
Anthracite	94	2 1/2	1 1/2

Note—Ash is deducted in all the above tests, and the percentages are calculated on the ash-free fuel.

Geologists assert that anthracite is the oldest of the naturally occurring solid fuels, and it is believed that many thousands of years have elapsed since those strata of the earth above which the anthracite is found were on the earth's surface and covered with swamps and vegetation.

The differences between the various classes of solid fuel can be most easily noted by heating strongly (to a red heat) one gram of the powdered fuel in a closed platinum crucible with a tightly fitting lid. The older anthracite and the semianthracite (or steam coals) give off only comparatively small amounts of hydrocarbon vapors; the bituminous and "cannel" coals swell up and yield one-third or more of their weight of volatile matter which burns with a luminous flame as it escapes from the crucible. The residue that remains in the crucible after these volatile constituents of the fuel have been driven off is composed of fixed carbon plus the mineral constituents of the fuel; and from the physical character of this coke the class to which the fuel belongs may be determined. The following table gives average figures for the approximate analysis of the various classes of fuel:

TABLE 2. APPROXIMATE COMPOSITION OF TYPICAL FUELS

Class	Coke, %	Carbon, %	Volatile %	Ash, %
			Fixed	
Anthracite	96	93	4	3
Steam coals	88	78	12	10
Bituminous coal	67	57	33	10
Peat	32	30	68	2

It must be remembered that the carbon, hydrogen, oxygen and nitrogen are present in the natural solid fuel in forms of combination that have not yet been fully investigated and that the gaseous and solid products obtained on heating coal are "decomposition products."

According to Wheeler, coal may be regarded as a conglomerate of two main types of compound. One of these on heating to a comparatively low temperature yields inflammable gases and vapors, while the other class requires a higher temperature and prolonged heating to decompose it. In a paper contributed to the Chemical Society, London, in 1911, Wheeler and Burgess described an apparatus and method by means of which they had been able to collect separately the whole of the gases evolved from different samples of coal at different stages in the heating process.

*Liverpool, England.

They had previously shown that a compound existed in coal which decomposed rapidly at a temperature lying between 700 deg. C. and 800 deg. C. and yielded hydrogen as its principal gaseous product. At the same time it was evident that at lower temperatures of distillation the paraffin hydrocarbons, and not hydrogen, were the chief products; and it seemed reasonable to suppose that the difference was due principally to the temperature at which decomposition was effected.

From the results given in a later paper by the same author, it is apparent that coal contains a compound of less stability to the action of heat and that this less stable compound yields the paraffins as its gaseous decomposition products. Thus they find that the paraffin hydrocarbons form by far the largest proportions of the first gases evolved at temperatures either above or below the "critical period" of decomposition. At temperatures below the critical period, during the first few seconds of heating, 1 or 2 per cent. of hydrogen at most is evolved.

Presumably, therefore, coal contains two types of compounds of different degrees of ease of decomposition—the one, the more unstable, yielding the paraffin hydrocarbons and no hydrogen; the other, decomposed with greater difficulty, yielding hydrogen alone as its gaseous decomposition product.

There seems therefore to be considerable justification according to Wheeler and Burgess for assuming that one type of compound in coal, and the most important type, is a degradation product of cellulose. This type, from preliminary experiments the authors have made on the destructive distillation at high temperatures of pure cellulose and oxycellulose, is identified with the "hydrogen-yielding constituents" indicated by their experiments with coal. The "paraffin-yielding constituents" are most probably derived from the resins and gums originally contained in the sap of the coal plants, and these form the "cement" of a conglomerate of which the cellulose derivatives are the base.

INFLAMMABILITY OF DUST

A property common to all coals is their inflammability when in the form of dust, and in a third paper communicated to the Chemical Society, London, in 1913, Wheeler gives details of an investigation carried out by him in 1911-1913 to prove that the percentage of volatile matter yielded by a fuel is no guide to its inflammability. That there should be no relationship between the inflammability of different coal dusts and their contents of volatile matter as determined in the usual manner is not surprising. The determination of volatile matter simply consists in heating the coals to a high temperature and in driving off the gases that can be driven off at that temperature. Such a process can make no distinction between substances of different ease of decomposition that may be present in the coal, for it decomposes them all; nor can it offer any information regarding the proportions in which such substances may exist in different coals.

It was necessary in Wheeler's investigation to obtain some means of determining the relative proportions of readily decomposed constituents in different coals. The method employed was to measure the volumes of paraffins evolved per gram of the ash-free dry coals on heating them in a vacuum at 650 deg. C. A more readily applied method is that of determining the percentages of the coals extractable by pyridine. The extraction with pyri-

dine was carried out on from 3 to 10 grams of the dried and sieved coal dust in a Soxhlet fat-extraction apparatus. Some coals were attacked by pyridine much more rapidly than others, a dark burnt-amber color being imparted to the liquid in contact with the coal.

Such coals usually, but not always, contained a high percentage of extractive matter. Other coals gave to the pyridine a light raw-sienna color, the solution being highly fluorescent; these coals yielded between 20 and 25 per cent. of their weight to solution in pyridine. This extraction does not effect a complete separation of the resinous ("paraffin-yielding") from the humus ("hydrogen-yielding") constituents, but inasmuch as all that requires to be known is the relative proportions of the former in a number of coals, for comparison with their relative inflammabilities, complete separation was not necessary. We may therefore according to Wheeler take the percentage extractable by pyridine as affording a rough measure of the relative proportions of readily decomposed constituents in the coals experimented with. The following table, giving some of Wheeler's results, has been compiled from the figures given in his Chemical Society paper of 1913:

TABLE 3. PYRIDINE EXTRACTIONS OF COALS COMPARED WITH THE RESULTS OF THEIR APPROXIMATE ANALYSES AND RELATIVE INFLAMMABILITIES

Relative Inflammability, Deg. C.	Pyridine Extraction, %	Volatile Matter, %	Fixed Carbon, %	Ash, %
995	38.8	32.7	60.8	4.5
1005	37.9	30.6	64.7	4.1
1015	36.2	35.7	60.0	2.2
1020	34.9	31.6	62.7	4.8
1025	34.7	31.4	64.3	2.8
1035	29.7	35.0	62.0	1.2
1045	27.9	32.4	63.1	2.5
1055	28.0	33.5	59.7	4.6
1065	28.1	30.8	64.6	4.1
1075	26.4	32.8	56.4	4.1
1095	18.0	25.0	71.1	3.6

A similar investigation relating to the ultimate constitution of coal by means of solvents has been carried out in the United States by Parr and Hadley, and the results have been published by the University of Illinois in Bulletin No. 76, Nov. 1914.

RESULTS OF AN IMPORTANT INVESTIGATION

The authors' summary of their results and conclusions, which support those of Wheeler, is as follows:

1. A study of solvents for the purpose of subdividing coal constituents without decomposition was carried out. Phenol was adopted as the most active solvent for the purpose of the investigation.
2. An apparatus was devised for carrying out the extraction so that the temperature of the phenol would be above 110 deg.
3. The application of the method to different types of coal showed that coal varied widely in the amount of material dissolved by phenol. The amount of soluble material seemed to differentiate sharply between subdivisions of coal types. On the ash and moisture-free basis the high volatile coals of Vermilion County, Illinois, give 35 to 40 per cent. of soluble material, the coals from Madison and Montgomery Counties in the same state give 30 to 35 per cent. and the low volatile coals of Williamson County, Illinois, show 20 to 30 per cent. of soluble material.
4. Extraction of coal leaves a residue which will not coke. The coking constituent of the coal is in the extract.
5. Residue and extract oxidize at room temperatures, and more readily at 100 deg., the rate of oxidation being more rapid in the residue.
6. Residue and extract possess an avidity for water as well as for oxygen at ordinary temperatures. The residue shows the

greater avidity in both cases. 7. Volatile matter determinations show that the extract contains more volatile matter than the residue. 8. The ultimate analysis of the coal, residue and extract shows that the percentage composition of carbon, hydrogen, nitrogen and oxygen is substantially the same. 9. Destructive distillation of the coal residue and extract gave gases of practically the same composition. 10. Oxidation of the coal residue or extract produces a lowering in the percentage of volatile matter. 11. Oxidation decreases the amount of material which may be extracted from coal by phenol, and the coking properties are also decreased in proportion to the extent of the oxidation. 12. Oxidation of the coal, residue and extract is shown by the increase in the percentage of carbon dioxide in the gases produced by thermal decomposition. It is concluded, therefore, that the oxygen absorbed is chemically held.

X

Proper Diameter of Sheaves for Hoisting Rope*

The increase in stress caused by running a rope over too small a sheave is unimportant compared with the resulting increase in rope wear, and considerations of economy can be trusted to prevent the use of sheaves and drums too small for the ropes.

The economical ratio between rope and sheave diameters varies with the character of the wire in the rope and the type of construction. A pliable rope can run more economically and safely over a small sheave than can a stiffer rope. The committee has reports of excellent results from the use of a 1 1/4-in. rope over an 84-in. sheave, which gives a ratio of 66, whereas in many cases, especially in deep shafts with long ropes which usually are of necessity stiffer, a ratio of 100 has been recognized as not too high.

In connection with the question of sheave diameters, one point should be noted—namely, that it is possible to make the ratio too high under certain conditions, or more correctly stated, it is possible to make the sheave too heavy. This is the case frequently with turn-sheaves, guide pulleys, rollers, etc., on which the arc of contact and

*Abstract from "Rules and Regulations for Metal Mines," by Ingalls, Douglas, Finlay, Channing and Hammond; Bulletin 75, United States Geological Survey.

the compression between sheave and rope may be so little as to allow slip, the rope failing to rotate the sheave.

Of course such a condition would cause wear and tend to deteriorate the rope faster than would the use of a smaller, lighter sheave. To decide on a suitable size of sheave under such conditions the following rule is serviceable: Suppose that a ratio between sheave and rope diameters of 72 is considered permissible. Then a 1-in. rope would require a 6-ft. sheave. When the deflection is 90 deg., this same result would be obtained by a rule reading: Multiply the degree of deflection by eight-tenths and by the diameter of the rope.

Apply this modified rule where the deflection angle of the rope is less than 90 deg.—that is, when the rope has less than 90 deg. of contact are on the sheave—and as the deflection angle or arc of contact becomes less, the size of the sheave will decrease. Under this rule, for a 45-deg. deflection angle a 3-ft. sheave will be required when a 1-in. rope is used, and for a zero degree or straightaway pull no sheave is needed.

Coal Output of South Africa

The Union of South Africa publishes its coal production in short tons and follows the unusual practice of announcing how many pounds there are to a ton. There are many states in our Union that would do well to take that precaution. It is usually impossible to glean from the context what is the size of the ton used, and in some states coal is sold by the long ton and recorded by the short ton. Yet no record is made in the state report to inform the reader which ton is used.

The record of the Union of South Africa for 1914 follows, based on \$4.86 per pound sterling:

Province	Tons Sold	Value at Mine	Value per Ton
Transvaal	5,157,268	\$5,592,626	\$1.08
Cape	53,621	151,472	2.82
Orange Free State	699,217	928,571	1.33
Natal	2,567,817	4,305,566	1.68
Union of South Africa	8,477,923	\$10,978,235	\$1.29

The high price of the Cape and Natal coals is largely owing to the amount of cleaning necessary. The Cape coal operators in August of this year rejected as waste 20.83 per cent. of the material mined, and the Natal operators so consigned 26.63 per cent., whereas the rejected material in the Transvaal was 12.97 per cent.

HE calls himself a mining man
And always speaks the title loudly,
While in his dealings with his clan
He acts impressively and proudly.
So downright practical is he,
So shy of mental acrobatics,
That he regards most hostilely
The faintest sign of mathematics.

IN reading, if his searching eyes
Fall foul of vinculum or bracket,
You see his ardent temper rise
And hear him make a fearful racket.
With something of the burning hate
Displayed by madmen or fanatics,
So is he wont to contemplate
The varied forms of mathematics.

The Bugbear

BY RUFUS T. STROHM
Written expressly for
COAL AGE



AHARMLESS radical is quite
Sufficient cause to make him hectic,
And as for formulas, the sight
Of one will drive him apoplectic.
He swears he cannot see the need
Of learning rubbish like quadratics,
And cannot be induced to read
A book involving mathematics.

THERE are a thousand things or so
On which he needs some information;
Like air compression, water flow,
Specific heat, and ventilation.
He ought to furbish up his brain
On heat, kinetics, hydrostatics,
Yet foolishly, with might and main,
He scorns the aid of mathematics.

HE does his best, by rule of thumb,
To meet the problems that beset him
Nor dreams the fatal day will come
When dullness and neglect will get him.
With others, he would rather snooze,
While cobwebs wreath their mental
attics,
Than buckle down and learn to use
The principles of mathematics.

Fuel-Combustion Improvers

SYNOPSIS—From time to time various chemical substances or the product of mechanical processes is placed upon the market with claims that these improve combustion, increase boiler efficiency, abate the smoke nuisance, decrease the cost of power, etc. A scientific test seldom fails to reveal the fallacy of such assertions, although certain mechanical processes possess a definite economic value if not overburdened with extravagant claims. The most efficient saver of fuel is a careful fireman.

In discussing the subject of combustion improvers broadly, two general divisions present themselves naturally—(a) mechanical devices and (b) chemical compounds, or a combination of some physical or chemical

a rank imposter or charlatan, one who knows his scheme is no good, but who is smooth enough to "put it over by hook or crook."

In a close analysis of the situation it is found that the majority of the exponents of the various devices and compounds on the market are not technical men. It's a case of "a little knowledge is a dangerous thing." One man who had spent a number of years in promoting a special process of fuel treatment to enhance its heating value did not know what a British thermal unit meant and recklessly asserted that anthracite coal had a higher percentage of volatile matter than bituminous, and for that reason his process was no good for the latter, for it was the volatiles he conserved. Another man confidently told a mechanical engineer that he could obtain 150 per cent. efficiency from his device for injecting su-

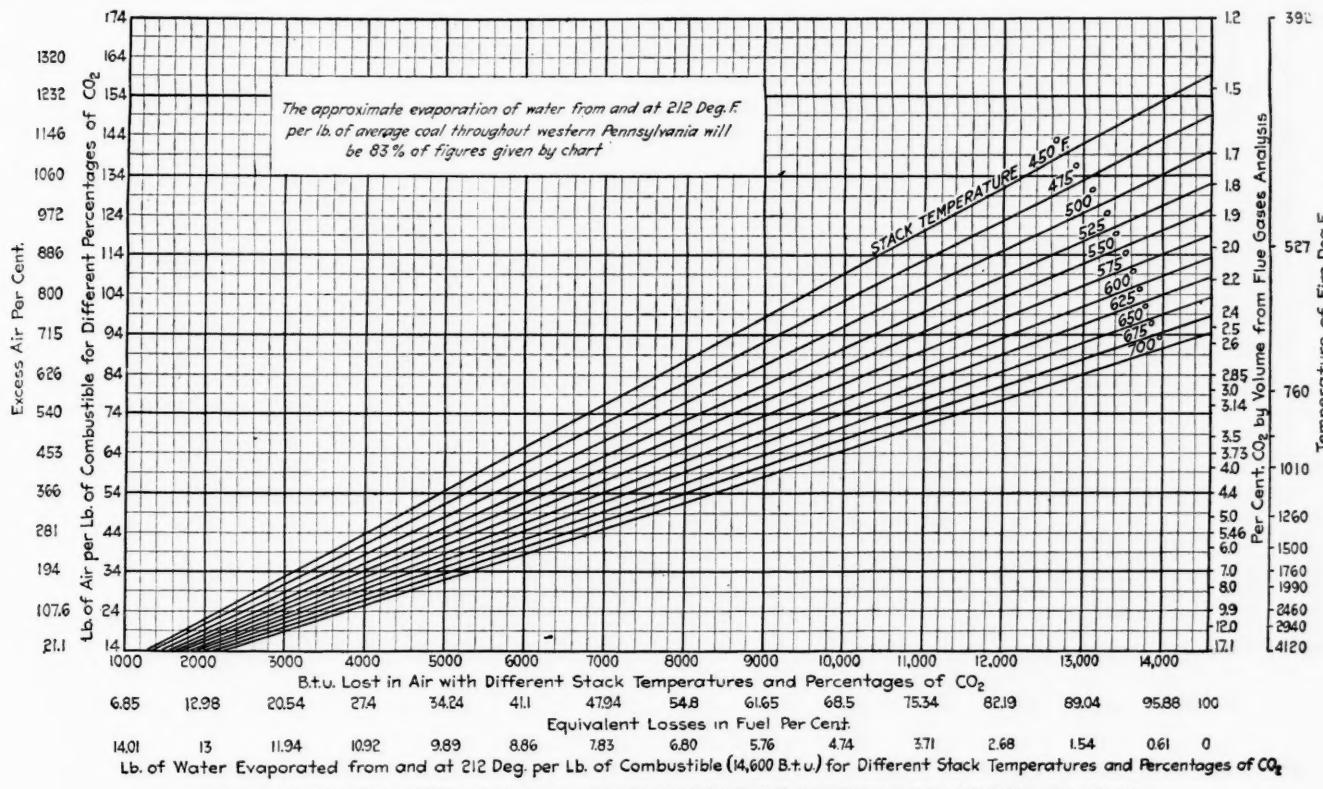


CHART SHOWING APPROXIMATE EVAPORATION OF WATER PER POUND OF COAL

process, illustrated by briquetting a fuel with a chemical binder.

As applied to the generation of steam for a boiler plant, an improver of combustion or an economizer of fuel could be defined as "A means of evaporating more water per pound of fuel than could be secured otherwise, as obtained under standard conditions of weighing the water evaporated, the fuel used, ashes produced," etc.

In these days of constant urging on the part of Government officials to conserve the natural resources of the country, economy in steam generation has come to the front. With it have come a vast number of mechanical devices and chemical preparations. The sponsors for them are for the most part sincere in their belief that they have a wonderful device or preparation by which a ton of coal can be made to evaporate twice as much water as it did formerly. Once in a while we come across

perheated steam into the firebox of the boiler. And so on *ad infinitum*.

You cannot get something from nothing. In the case of mechanical devices for economy in steam generation, they must be along well-known and approved lines, else they fail of their purpose. In the case of chemical binders and solutions they must have an inherent heat value or act as catalysts, otherwise they are diluents. Let us proceed to a few concrete examples:

Some years ago a man had a scheme of briquetting coke breeze, or coke ashes as they are popularly designated in the region where they are produced. His purpose was laudable, as there are thousands of tons of this waste from beehive ovens in the coke-making district accumulated in the years gone by which would be immediately available as a cheap fuel if some economical and satisfactory cleaning and briquetting scheme were developed.

This particular scheme was comprehensive. A big company was to buy up all the "ash dumps" and paralyze the regular coal trade by the cheapness and efficiency of its own product. Why did this most beneficent briquetting project fail? Let us examine the so-called composition fuel, analysis of which is given in the following table:

	Briquetted Coke Breeze	Natural Breeze
Volatile matter	14.52%	10.00%
Fixed carbon	33.51%	59.50%
Ash	57.97%	30.50%
Sulphur	0.80%	0.85%
Heat content, B.t.u.	6,594	9,890
Composition of the ash:		
Silica (SiO_2)	11.64%	
Alumina (Al_2O_3)	6.20%	
Lime (CaO)	15.14%	
Magnesia (MgO)	0.30%	
Iron oxide (Fe_2O_3)	15.86%	

The analysis of the ash of the composition fuel shows that plain, everyday cement was used as a binder in the briquetting process, as evidenced by the lime content and the physical appearance of the briquette itself. It did not take the consumer long to "get next" to the fact that for every ton of fuel burned more than a half-ton of ashes was produced. He did not need a chemical analysis to prove to him that such a fuel was dear at any price.

In this case the binder acted as a diluent, since it had no inherent heating value. It will be noted that the heat value of the composition fuel is only about two-thirds of that of the coke breeze in its natural state.

More subtle and convincing is the second instance, which had to deal with a chemical to be dissolved in water and sprayed on the coal or other fuel. Besides increasing the efficiency of fuel 25 per cent. or more, the additional claims were made that the use of the solution removed the sulphur, prevented clinkers and solved the smoke problem.

A physical examination of the solution used showed it had a specific gravity of about 1.05, which indicated approximately a 5 per cent. solution. In practice, 10 gal. of the solution to the ton was sprayed on the fuel as it was fired under the boilers. At this rate, not over $\frac{1}{4}$ per cent. of the chemical at the most would actually get on the coal.

Thus it will readily be seen that it must be a pretty active chemical to produce such amazing results in efficiency— $\frac{1}{4}$ per cent. to give 25 per cent. more heating value to the fuel. *Mirabile dictu.* The chemical examination of the compound to be dissolved in water is as follows:

Silica (SiO_2)	4.14%	Magnesia (MgO)	1.37%
Alumina (Al_2O_3)	11.33%	Sodium (Na)	3.83%
Calcium (Ca)	11.10%	Chlorine (Cl)	22.80%
Lime (CaO)	1.68%	Water and loss	42.94%

Dropping the terminology, in plain English the basis of the compound used was calcium chloride, a byproduct of the soda-ash industry. Ordinarily this chemical sells for about $\frac{3}{4}$ c. per lb., yet as a combustion improver it sold for 10c. per lb. A rose by any other name would not smell as sweet, it seems. There is a prevailing belief that saline substances like common salt, thrown on a fire, make it burn brighter and give off more heat. At least that must have been the notion of the promoter of calcium chloride.

As stated previously, practical firing tests indicated an apparent saving of fuel when treated with the calcium chloride solution. It would convince the ordinary boiler

house fireman, but the fallacy was shown on making evaporation tests.

For instance, a firing test lasting 5 hr. showed an apparent saving of about 20 per cent. by the use of treated coal, yet an evaporative test showed that practically the same amount of water per pound of coal was evaporated by the use of untreated coal as with the treated fuel. Furthermore, it was found that by spraying the dry raw coal with water—10 gal. to the ton—there was the same apparent saving in fuel as was obtained by the use of the chemical solution, yet no greater evaporation of water.

THE USE OF SALINE SOLUTIONS

The logical conclusion was that the "joker" was in wetting the coal, the calcium chloride exerting no influence whatever on the heating value of the fuel. Anyhow, if some boiler-room men think they obtain a greater efficiency by the use of saline solutions sprayed on coal, it would be great economy to buy the chlorides themselves instead of purchasing them in the form of expensive compounds.

As for the prevention of clinkers, it is almost absurd to think that such small amounts as $\frac{1}{4}$ per cent. of any chemical would exert any beneficent influence. The idea put forth was to combine the sulphur with the ashes by the use of the lime salt, but it did not work out, as evidenced by the following analysis:

	Raw Coal	Boiler Ashes
Volatile matter	28.090%	3.700%
Fixed carbon	62.260%	23.020%
Ash	9.650%	73.280%
Sulphur	1.235%	0.378%
Heat content, B.t.u.	13,209	.....

It will be noted that there is still some combustible in the ashes, else the sulphur would probably have all been burned out.

The flue gas from the coal treated with calcium chloride is normal, and as far as could be determined, the "smoke nuisance" was not abated. This is the analysis of the flue gas:

	By Volume
Carbon dioxide (CO_2)	7.4%
Oxygen (O_2)	11.2%
Carbon monoxide (CO)	nil
Methane (CH_4)	0.2%
Nitrogen (N_2)	81.2%

A third gentleman spent 8 or 10 yr. in perfecting a briquetting scheme for anthracite culm, which corresponds to the waste from coke ovens. This was another laudable undertaking, but unfortunately the briquetted fuel did not meet the claims of the enthusiastic inventor.

This briquetting scheme was along well-known and approved lines, the binder probably being a coal-tar derivative. The mistake of the promoter was in the claim made for enhancing the heat value—as much as 100 per cent. It would not take an intelligent consumer long to find out he was being "stung." The analyses of some of the briquettes are as follows:

	Sample No. 1 Anthracite Culm Briquettes	Sample No. 1 Stove or Chestnut Anthracite
Volatile matter	12.760%	12.220
Fixed carbon	58.740%	77.280
Ash	28.500%	10.500
Sulphur	1.007%	0.769
Heat content, B.t.u.	9,030	12,347
Composition of the ash:		
Phosphorus (P)	0.020%	0.036
Silica (SiO_2)	16.130%	4.670
Alumina (Al_2O_3)	8.310%	3.320
Lime (CaO)	0.300%	0.440
Magnesia (MgO)	0.100%	0.100
Iron oxide (Fe_2O_3)	1.500%	0.930

It is readily seen from the analysis that there is no enhancement of the heating value, though the binder does not act as a diluent as in the first briquetting scheme. The briquette was bona fide in that respect, and such a process has a positive commercial value when not improperly exploited. The chemical analysis shows that about 5 per cent. of the so-called binder was used, which in addition to the great pressure exerted in the process made a very acceptable briquette or eglette.

Finally, the best combustion improver or fuel economizer is the man who shovels coal into the boiler furnace if hand-firing is the practice. If correct methods of firing were introduced in the boiler room and followed up, there would be little need for artificial accelerators. The temperature of the stack gases, their composition, the depth of the fire, etc., have more to do with the amount of water evaporated per pound of coal than anything else.

Any campaign for economy should be along these lines. It would appear well worth while to install portable gas-analyzing outfits in the boiler room to check up the combustion. This method used in conjunction with the stack temperatures would serve to show the losses in fuel or the efficiency attained.

P. W. Matthews, a mechanical engineer of Scottdale, Penn., has worked up an interesting chart that could be used to advantage in the interpretation of the results of the flue-gas analysis and the stack temperatures. This is shown herewith.

To illustrate: Assuming that the flue gas shows 5 per cent. CO_2 and the stack temperature is 600° F., by referring to the chart it will be found that there is a loss in fuel of about 41 per cent. and that only 7.4 lb. of water is evaporated per pound of coal, with the correction noted. Again, if the stack gas shows 10 per cent. CO_2 and 500° F., the loss in fuel is between 16 and 17 per cent., and the water evaporated (12×0.83) is about 10 lb. per pound of coal.

In the flue gas cited elsewhere, with 7.4 per cent. CO_2 , the fuel loss is about 23 per cent. and the water evaporated about $9\frac{1}{2}$ lb. By actual weight the water evaporated was 9.2 lb. per pound of coal.

Mr. Matthews' chart is novel and should demand attention from those interested in fuel economy.

X

Extracts from a Superintendent's Diary

Today I rode through a deserted coal-mining camp. Only a few years ago it was known far and wide as the model camp of the state, but now its glory has faded and rack and ruin greet the eye at every turn. Any abandoned mining camp presents a cheerless prospect to a visitor, but to see this once-prosperous village so quickly reduced to the last stages of decay was especially depressing to me because I am familiar with so much of its inside history.

The founder of the camp was a true reformer with advanced ideas about the responsibilities attached to wealth, and in planning his village he left no stone unturned in his effort to meet all of the responsibilities as he saw them. One-half of the residence portion of the camp was reserved for men who might desire to purchase their own homes, and every encouragement was given to workers to make such purchases possible. The lots were sold at a price that left only a fair profit on the

original investment, and houses were built to suit the purchasers on payments spread over long periods.

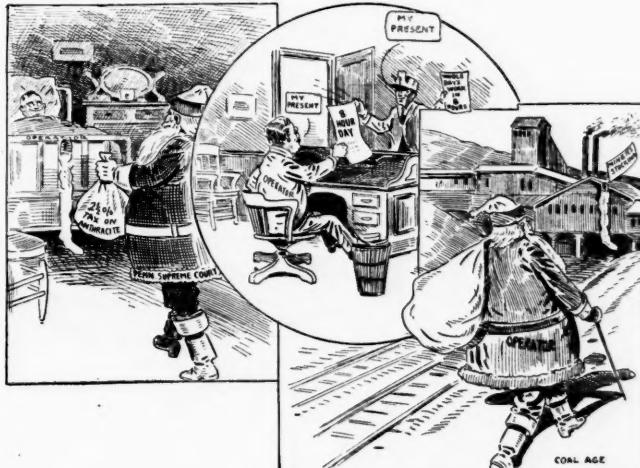
Many of the lots were sold and attractive homes sprang up everywhere. Still today the man who planned it all rests in a suicide's grave, and all over the land men and women recall him as the man who induced them to make unfortunate investments from which they will probably never fully recover. A few have lived long enough to become convinced that the failure of the mine could not have been foreseen, but just after the crash, almost to a man, they believed that the failure was premeditated. Even after the founder took his life, feeling against him ran high, and rumor had it that the deed was the result of a troubled conscience.

If unlooked-for faults had been encountered or the company had been wrecked by a terrible calamity, such as a fire or an explosion, people might have understood; but how can simple folk be expected to understand that the opening of a new coal field, entitled to lower freight rates on account of its location, may force competing companies into bankruptcy?

Nor was the lot of the founder a happy one even before the final crash. At one time the workers called a strike, and almost as soon as the men walked out reporters arrived on the scene to fill the newspapers with stories about the heartless mine owner who contemplated closing down his mine that he might starve his employees into submission and that in face of the fact that these selfsame employees had invested their savings in his enterprise. And during normal times occasionally the wanderlust would seize one of the workers who had invested in a home, and if forthwith he could not find a purchaser (as if such a thing were possible anywhere) he would begin to make remarks about the man who had made him a slave for life. In contrast to the man who desired to leave and could not, would often be found a man who should have been forced to leave because of violation of rules and regulations, yet was allowed to remain because the founder could not long enough get his conscience under control to order the man out of a home which he himself had sold him.

It seems a hard thing to say, but I returned home today firm in the conviction that the majority of mining men are ever destined to be homeless wanderers on the face of the earth, not because mine owners are indifferent to their responsibilities, but because fate so wills.

X



CHRISTMAS PRESENTS

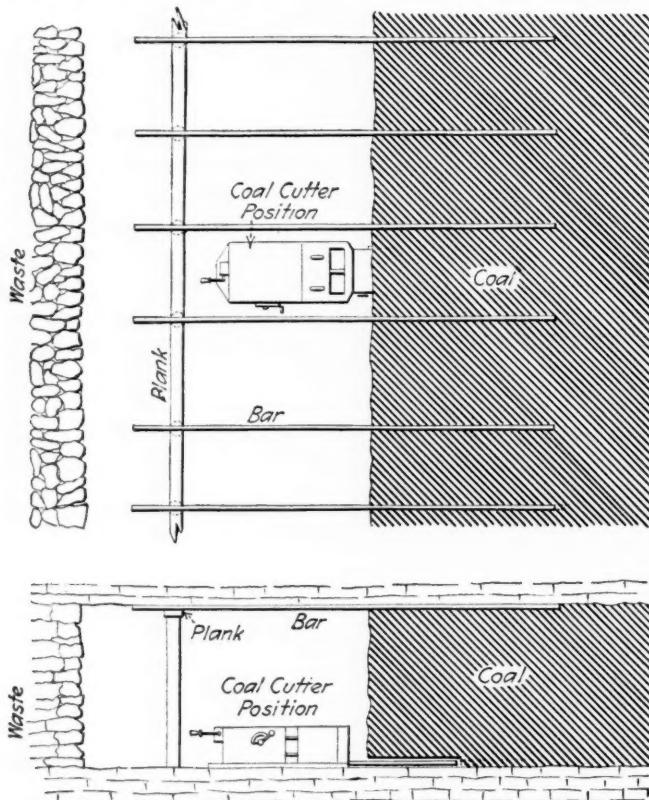
Details of Cutter Operations

By J. F. K. BROWN*

Sometimes in the course of operating coal-cutters, local areas of bad roof develop. As a rule such occurrences are most frequently met with in those seams which have either a shale covering or a thin sandstone roof with shale above. In nearly all cases it is the management's desire to keep up the roof if possible in order to avoid unnecessary deadwork, since when under these circumstances a roof develops frequent falls because of a local weakness in the strata, there is a much increased cost of operation placed upon that section.

Furthermore, a roof of this nature, when once broken, frequently is difficult to catch again, and so the trouble gradually spreads until it may perhaps cover a wide area.

In one case where trouble from such a cause was constantly occurring, the following steps were taken to



SKETCH SHOWING HOW THE BARS WERE HANDLED

counteract it. The seam was 4 ft. 6 in. thick, and the roof was a shale in which false bedding was strongly developed. Under normal conditions, operating a coal-cutter at night undercutting the seam 3 ft., this roof proved satisfactory, but there occasionally developed areas in which the shale would start falling heavily, or "running," as far as could be judged, through an extra well-developed line of bedding.

Once this fall took place, it became a regular nightly occurrence to find the machine buried at this point, and as the face advanced farther, this broken area gradually widened out. It seemed possible that only after a great expenditure of money on extra timbering during many months' work would the regular roof be again held. To overcome the difficulty, as soon as a soft spot manifested itself a policy of supporting the roof in advance of the coal-cutter was adopted.

Twelve 1-in. iron rods, 9 ft. long, were obtained and, with a 3x2-in. plank at least 12 to 15 ft. long, were brought into the workings, as was also a drill with an extra long twist steel and a 1½-in. bit of such a type that drilling could take place in a practically horizontal plane at the roof of the seam.

With the drill, holes were driven horizontally at the roof about 3 ft. apart to a depth of roughly 6 to 8 ft., the rods being inserted and the projecting ends upheld by the plank, which in turn was "proped" by the usual mine timber. This provided a support for the roof before the coal-cutter came along during the night shift.

On the coal-cutter reaching the props supporting the plank, they were withdrawn one by one as the machine advanced and reset behind it. When the coal was loaded out, the rods had still about 3 ft. of advance grip on the coal roof. The alternate rods were then withdrawn and drilled in again a further 3 ft. or more, until the entire set had been advanced to the original position ready for the night's cut. This process was repeated until the roof appeared to have regained its normal strength, when the rods and plank were laid aside for future use.

By this means the skin of the roof on the top of the coal is preserved intact, and a great deal of awkward work in getting rid of much fallen material is obviated. There is of course the extra labor involved in setting up the bars, but it costs less than removing the broken rock night after night, not to mention the loss of time in cutting. Furthermore, if this work can be accomplished during the daytime and so does not interfere with the cutting time of the machine.

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Coal on Island of Bornholm

It has just been reported, says *Commerce Reports*, that coal in some quantities has been discovered on the island of Bornholm, which is not far from the coast of southern Sweden, but which is a possession of Denmark. It is probable that the presence of coal on this island has been known for some time, but its commercial exploitation has been retarded by the competition of other European fields.

Because of the war this competition has for the time being lost its force, and two Danish geologists and a Swedish mineral surveyor have proceeded to Bornholm to look into the possibilities of the new field, with special reference to marketing the fuel should it prove suitable for railway and industrial use. The deposits are said to be a short distance from Ronne, the chief town of the island.

X

Preparing Typewritten Matter for Blueprinting

It is often desirable to blueprint a typewritten sheet. By making use of a simple but little-known kink, this can be satisfactorily accomplished. It is almost impossible to get a satisfactory blueprint from an ordinary typewritten sheet; but if, when the sheet is being written, a piece of carbon paper is put behind it so that the carbon transfers to the back of the paper, the typewritten sheet will give a perfect blueprint. This is because the impression of the typewriter ribbon is reinforced by the carbon on the back, neither one being heavy enough alone to give a satisfactory print.—*Engineering and Mining Journal*.

Observations and Experiences in Mine-Inspection Work

BY J. J. RUTLEDGE*

SYNOPSIS—Permissible explosives required in mining coal on Indian lands in Oklahoma. Accidents due to shooting long holes, rapid firing, careless tamping and overcharging of holes and numerous other causes arising from neglect or ignorance of the miner. The practice of firing "cracker shots" condemned. Accidents occur more frequently on Saturdays than at other times.

The Southwestern District of which I, as district engineer for the U. S. Bureau of Mines, have charge consists of the states of Texas, Arkansas, Oklahoma, Kansas, and southern Missouri. So far as accidents are concerned, we have little trouble in Arkansas, and scarcely any in Missouri, but one or two accidents having occurred there during the past year. Most of the calls for rescue work, or for investigations of mine accidents, come from the Oklahoma and Kansas coal fields. I will briefly mention a few observations that I have made in these coal fields.

By far the greater portion of the coal produced in the two states last named is shot off the solid with black blasting powder. It may not be known to all that the Secretary of the Interior issued an order, which took effect recently, requiring the use of permissible explosives in all mines on Indian Lands in Oklahoma, but providing the alternative of using black powder for shots fired by electricity from the surface, after everyone had left the mine. It was in compliance with this order that recently an examination in detail was made of all mines on Indian Lands in Oklahoma. These mines are on the segregated Indian coal lands, and the leases are made with the coal-land trustees of the Choctaw and Chickasaw Nations. Each lease stipulates that the Secretary of the Interior may, at any time, issue regulations governing the operation of the mines. Of course these regulations always recognize the police powers of the state. In making the examination, the following dangerous practices were noted:

SHOOTING LONG HOLES AND RAPID FIRING

One of the most frequent of these practices that have resulted in trouble is the shooting on the solid of extremely long drillholes. One foreman was heard to remark, "That long hole pulled that time; next time I'll try a little longer one and give it a little more powder. Then, I'll just have to set my post up the one time, while if I drill shorter holes I must make more set-ups, which makes extra work."

A second great cause of accidents has been the extremely rapid firing of the shots. Most of the recent disasters were caused by undue haste in shooting holes. In some instances 45 to 50 shots have been fired in as many minutes. On a pitch of anywhere from 15 to 35 deg. and, in some cases, even 60 deg., it is difficult to imagine how a shotfirer can get around fast enough to fire so

*Proceedings of the eighth annual meeting of the Mine Inspectors' Institute of the United States of America, held at St. Louis, June 8-11, 1915.

many shots in so short a time, much less to tamp and fire them.

Another source of trouble has been the careless tamping of shots. There is little or no restraint on the manner of tamping. The Oklahoma law requires that all shots shall be tamped by the shotfirer, after every other person has left the mine. Quoting literally from a good authority: "The shotfirer, in many instances, has confidence in certain miners and, in some cases, allows the miner to tamp the shots for him, in order to lessen his own labor. Another trouble is that the 'dummy' filled with tamping, or stemming, which is provided by the miner is often not used by the shotfirer, but thrown into the gob instead. If a dummy is broken the shotfirer will not use it and does not stop to make a new one."

Another trouble is that resulting from two shotfirers firing shots on the same run. If an explosion occurs, or a windy shot, or a gas ignition, generally both the shotfirers are caught and either severely injured or killed by the accident. The shotfirers should each have separate runs, so that should an accident occur on one run it will probably not harm the man on the other run. The use of slack dummies, or dummies filled with coal drillings, has also resulted in accidents, the dust and fine coal in the dummies propagating the explosion or flame from the black powder.

SHOOTING WITH OR AHEAD OF THE AIR

Still another trouble is firing shots advancing with the air current instead of against it. This practice should be prohibited. In some instances, several shots have been fired at one time, and disasters frequently result, especially in narrow places. Still another trouble has been caused by premature explosions resulting from the use of short fuses. Recently, several shotfirers have been burned and injured by premature blasts, resulting from the ignition of gas and the consequent lighting of the fuse and the firing of dependent shots, in advance of the opening shots.

Another cause of accident has been the firing of a "split shot," or a shot that is made by drilling a hole into a mass of coal that has been cracked and shattered by a previous shot. Frequently a hole is drilled under these circumstances and charged with black blasting powder. A number of accidents have resulted from this cause. People who are well informed on the subject state that the average life of a shotfirer in Oklahoma is two years. I think it was Mr. Wilson who advocated, a few moments ago, the certification of shotfirers. It would seem from what I have just said that the less intelligence the shotfirer possessed the better fitted he would be to fire shots under some of these conditions.

Another trouble is shooting ahead of the air. Often there is a room-neck or a crosscut containing standing gas, and a windy shot occurs in the entry inby of these places and ignites the gas and the shotfirer is burned, usually fatally, before he can get out of the place. An additional cause of accident I have noticed in the Southwest is the use of short-cuts by the shotfirer, when making his rounds.

Sometimes a room has been driven through from one entry to the entry above or below, and the shotfirer goes through these rooms in order to shorten the distance he has to travel. This haste does not give the gases generated by the firing of the shots time to dissipate; nor does it allow the fine coal dust stirred up by the force of the explosion sufficient time to settle and, in this way, contributory causes to an explosion are created.

Shotfirers should not use these short-cuts, but should follow the courses taken by other mine employees when going through the mine workings. There will be time enough, then, to allow for the cooling of the gases liberated by the explosion and the settling of the fine coal dust. The Oklahoma mining law provides for a good system of telephones, and I am glad to say that this law has been universally enforced. It has been suggested and one or two of the inspectors have instructed their shotfirers to use these telephones in the entry to notify the engineer on the surface of the progress of their work. There is always someone on duty on the surface when the shotfirer is at work, whom he can inform when he starts firing on an entry and again when he has completed the work in that entry. Then if anything happens to the shotfirer those on the surface who go to his aid know where to look for him. At times, the entire mine workings have been searched before the disabled shotfirer has been found in the least expected place. The telephones are in the mine, in compliance with the law, and they should be used for the purposes intended. About a year ago an injured shotfirer reached a phone in his entry, called for help and, receiving prompt assistance from the surface, was soon in the hands of the doctor.

FAILURE TO TEST FOR GAS BEFORE FIRING

Frequently, shotfirers fail to carry safety lamps to test for gas and, as a result, are burned by walking into a body of gas with a lighted open lamp on their head. Recently, a shotfirer working on a pitch of about 55 deg. went into a room, the face of which was a slight distance ahead of the air. Neglecting to make a test, he ignited the gas with his naked light and, in trying to get out of the way of the burning gas, fell down the pitch. This man was more hurt by the fall than by the slight burns he received.

In the Kansas coal field, during the past winter, we had one shotfirer who, in two months' time, had three buddies killed while they were firing shots in the mine with him. In each instance this man has escaped uninjured while his pardner has been killed. An interesting incident that occurred in Kansas I will mention here was the escape of a shotfirer wearing a self-rescue breathing apparatus which he had fitted on his face and was using while at work firing the shots. He reported that the self-rescue apparatus undoubtedly saved his life. The "buster," or "opening," or "A" shot, when coal is shot off the solid, has resulted in small explosions, and this danger was recognized in the orders of the mine inspector and is now prohibited by the mining law.

Speaking of mining law, I desire to mention a remarkable condition that I found in Oklahoma. One of the first things I did after reaching that field was to codify the mining laws of Oklahoma. There were some four or five regulations, which were enforced by the mine inspector and which I assumed were in the mining law but could not be found when this codification was completed.

One of these regulations is the requirement of safety chains on man-trips. Another is the requirement that the mules be taken out of the mine at night. These were good measures. I found that five or six such orders had been issued by the inspector. They had all the effects of law, but were not on the statute books and yet they were obeyed implicitly.

Another trouble is the "double-cracker" shot, by which is meant a hole drilled in a straight face of coal to a distance of from 3 to 6, and in some cases 10 ft. and charged in most cases with dynamite. Sometimes, these holes are 12 or 14 ft. deep. I have myself measured a breast-auger that was 14 ft. 8 in. in length. It was so long that it could not be taken around a switch without bending the auger. These holes are drilled horizontally, and, usually, in pairs, in the same vertical plane and from $1\frac{1}{2}$ to 2 or 3 ft. apart. Of course, it would be dangerous to fire such holes with black powder, but the miner thinks that he is safe in using dynamite, which he thinks explodes without flame, and is not apt to ignite gas or dust. Formerly, all the shots were charged and fired with dynamite; but, recently, permissible explosives have been used instead of the dynamite, which is one of the good results accomplished by the demonstration of permissible explosives in these mines.

"CRACKER SHOTS" CONDEMNED

The practice of firing "cracker shots" has been long established and it would be difficult if not impossible to change it. The purpose is to crack the coal so that the miner is enabled to make a shearing with his pick more easily, at that point. Of course, it is necessary to exceed the charge limit fixed by the Bureau of Mines of $1\frac{1}{2}$ lb., when firing shots of this sort; but if one cannot get a whole loaf it is better to take a half-loaf, and it is far preferable to use "permissibles" in this manner, than to fire these shots with dynamite. Permissible explosives are now almost universally used in these cracker shots.

Sometimes they use from four to six sticks of permissible powder, each $1\frac{1}{4}$ or $1\frac{3}{4}$ in. in diameter by 7 or 8 in. in length. Two or three years ago I was talking with a miner in one of the mines where there had been a very serious disaster, and asked him what amount of charge had been used in some of the very long holes. He informed me that he had used 13 sticks of permissible explosive, but added, "That was the limit." On my inquiring why he had not filled the hole to the mouth with the explosive he repeated his statement that 13 sticks was the limit. He showed, on further inquiry, that he was fully informed as to the danger of such shooting, for he stated that he would not think of firing such shots with black powder.

USE OF PERMISSIBLE POWDER

The point I would emphasize is that when you have to deal with conditions such as I have mentioned, it is better to realize that fact and cut the cloth to suit these conditions. We have had excellent coöperation on the part of the mine operators, regarding the use of permissible powder in these cracker shots. Of course, if you adhere to the limit charge in a shot of that sort you would get no result in the amount of coal produced. We still have a little trouble with dynamite being used in these cracker shots; but, generally speaking, so far as my observations go, this dangerous explosive has been almost eliminated from Oklahoma mines.

I will refer to another curious situation that has developed. One or two mines, using permissible in the proper manner, adhering to the limit charge, and blasting the coal down in workmanlike manner after it has been undercut by a mining machine, have continued to fire the "brushing shots" in the roof, with black powder. The brushing shot is generally fired after the coal has been blasted. The permissible explosive is quicker in action than black powder and, in the immediate vicinity of the drillhole, does shatter the coal much more than black powder would. That is to say, the coal is crushed finer in the circumference of the drillhole when permissible is used, than is the case with black powder, especially, if the hole has been overcharged. To fire the black powder into a cloud of fine coal dust suspended in the air is a dangerous practice. But, in this mine, black powder was used only in the brushing of the roof, and generally only one brushing hole was fired, to each machine cut made. The old saying is that "A chain is no stronger than its weakest link." This practice was the weak link which might cause disaster in that mine, although all other operations were safe. However, the use of the black powder in this mine has recently been discontinued.

FREQUENCY OF ACCIDENTS OCCURRING ON SATURDAYS

Another rather remarkable thing is the number of accidents that have occurred on Saturdays. The shotfirer is in the mine after everybody has left. He does his work anywhere from 4 to 12 p.m., and so many accidents happen on Saturdays that our men, in the danger season, never leave the rescue stations, on these days, until one or two o'clock a.m. Some of the Kansas rescue men have, as a result, reached a mine within forty minutes after an explosion. The only way that I can account for the frequency of explosions on Saturdays is that the shotfirer is in haste to complete his work on that evening.

I remember now that last July we had one on the second, and had just about completed our inquiry into that one when we had another on the sixteenth. It was the same way this season, and I believe it must be that the shotfirer is in a hurry to get out and is careless or hasty in his work. A man certainly is careless when he shoots ninety shots in forty-five or fifty minutes, as was done in a recent case of a shotfirer's explosion. Those who have fired shots know that they cannot be tamped and fired in that time.

But, I am glad to report some advances in the Kansas field; they have at the present time, certainly two, possibly three, electric-shotfiring systems. Two of these have been in use for some time. The other one, I think, has only recently been introduced. We still have in Oklahoma the electric shotfiring system, which has been in use in one mine—Alderson, 38—for four or five years. In talking with the miners in Kansas, especially the foreign-born miners, I have been interested to learn that they were nearly all in favor of the electric-shotfiring system. I could not understand the reason for this until I went below and looked over the conditions, and it seemed to be a fact that the output had increased about 100 tons per day, after the introduction of those systems. Investigation showed that a man could fire more shots than he could under the other system, as formerly the shotfirer would only fire two or three in each working place. But I think the men in Kansas lately made an agreement limiting the number of shots to three in each working place

when firing electrically; we have always had that rule in Oklahoma.

It is impossible to use chain mining machines on the steep-pitching seams, so that most mines are using a post-puncher machine instead, and with the use of permissible explosives, the practice is spreading. Rooms, as well as entries, air courses, and all narrow places are cut by means of a post-puncher, either overcutting or undercutting the coal, but little shearing is done. One or two remarkable and economic results have obtained from the use of the post-puncher. In overcutting, the draw slate has been cut out by the use of this machine, and the cutting has been thrown into the gob. It has been found, after this overcutting, that the fine coal made has been clean enough for marketing without washing, and all are interested in this method of mining that avoids the necessity of washing the coal.

In some of our mines having the best discipline the superintendent requires that a shotfirer shall spend at least four hours in the mine, and this rule has reduced the number of accidents, as it requires him to take more time for his work. I have operated mines, in times past, in the Springfield district, in Illinois, and I think that is the most suitable coal I have ever found for shooting off the solid. To my knowledge, there are some of the grandsons of the old original miners that are now mining there. But shotfirer's accidents are rare in that district. However, I am not so strong for solid shooting as formerly. I have given these few rambling remarks drawn from my own experience in the last two years and a half, in mines on the Indian lands in Oklahoma.

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Cutting Out the Mica

It has been found from experience that in many cases the sparking of motor commutators can be prevented by cutting out a part of the mica insulation between the bars. A V-shaped slot is cut, the bottom of which is about $\frac{3}{2}$ in. below the surface of the copper, while a thin strip of mica is left at each side. The leaving of this strip of mica at the side of the slot prevents the formation of an electrical connection between adjacent bars by any accumulation of carbon or other material in the slot.

There seems to be a tendency in some cases for the mica to wear down more slowly than the copper, and if this occurs there will be sparking. This should be stopped by cutting out the mica as suggested.

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An Application

Among a number of applications received recently by a large coal-mining company was the following orthographic gem:

Sir: I have bin informed by the Engr. Agency that you are in need of a Transetman. I would like to accept a passisian of that kind if you think me caperable of holding the passion.

I have had Six Years experence in R.R. Const. and Loc. and am a fairly good drausman and have bin in mines with Mineing Engr. good many times. Can furnish you with rep. if need to. Yours Verry Truly,

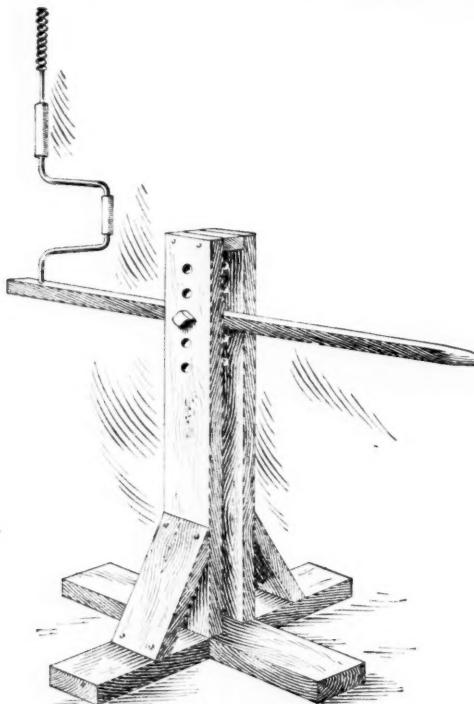
P. S. Can report in verry Short notice 5 days.

A Home-Made Boring Jack

BY SIM C. REYNOLDS*

It is frequently found necessary in mine work to drill vertical holes in the roof. For the spuds in engineering work a brace and bit will usually suffice where the hole to be drilled does not exceed $\frac{1}{2}$ in. in diameter and 3 or 4 in. in depth.

But where wider and deeper holes are required for the insertion of trolley hangers, signal or telephone wires or any wiring that has to be hung from the roof, the drilling of such holes is sometimes a difficult task by the ordinary method. This is particularly so when the roof strata are flinty or extra tough, and the strength of two men is often required to do the work. Under many conditions it is even then an exceedingly slow process.



A SIMPLE AND EFFICIENT BORING DEVICE

These considerations in part prompted the designing of the device shown in the accompanying illustration. This simple arrangement has been found quite efficient for the work intended.

As the illustration shows, the device is built on the lines of the ordinary lever-jack, and while it requires two men to do the work, one at the drill and the other at the lever, this is largely compensated by the extra speed with which holes may be forced in. Furthermore, if properly constructed the device may be easily moved from place to place, one man being able to carry the outfit. This is a decided advantage when drilling is to be done in a roadway where hauling is going on.

Holes closely bored in the uprights and lever and protected by metal bushings to prevent undue wear, with an efficient and easily removed cotter-pin, obviate any possible difficulty in driving the hole reasonably straight. The occasional easy adjustment of the lever in or out, up or down, as the needs may require, neutralizes the natural tendency of the pressure point to describe an arc and thereby prevents the bit from "binding" in the hole.

*Houston, Penn.

Naval Coal Requirements

That probably 200,000 tons of coal a month would be required by the navy between Panama and Manila in time of war and that this would have to be either Pocahontas or Welsh was set forth by Capt. A. P. Niblack, U. S. N., before the Society of Naval Architects and Marine Engineers. Captain Niblack's paper was a plea for preparedness.

Assuming that a fleet consisting of 30 battleships, 20 of our largest cruisers, 40 destroyers, 20 colliers, 3 supply ships and the fleet repair ship "Vestal" made a leisurely voyage from Panama to Manila by way of Honolulu, Midway and Guam, a distance of 10,000 miles, Captain Niblack calculated that the fleet would consume 18 tons of coal and $3\frac{1}{2}$ tons of oil per mile going at a speed of only 10 knots, or a total of 202,000 tons of coal and 36,800 tons of oil. In addition it is estimated that the fleet would be in port a total of 50 days and that it would consume 1,000 tons of coal and 160 tons of oil daily, making a total of 30,000 tons of coal. In his paper Captain Niblack presented the following tabulation:

	Sea Miles	Coal	Oil
Panama to Magdalena.....	2,265	49,000	8,500
In port 5 days.....		5,000	800
Magdalena to Honolulu.....	2,543	55,000	9,500
In port 5 days.....		5,000	800
Honolulu to Guam via Midway.....	3,450	74,700	13,000
In port 10 days.....		10,000	1,600
Guam to Manila.....	1,542	33,500	5,800
In port 10 days.....		10,000	1,600
Total	10,000	242,200	41,600

To show the amount of fuel left over at the end of the voyage Captain Niblack said: "Taking from the Naval Pocket Book the bunker capacities of all the ships enumerated as comprising this fleet, adding to it the carrying capacities of coal and oil of the 20 colliers and comparing the sum with the consumptions of fuel in the foregoing table, we have, in tons:

	Coal	Oil
In bunkers	120,000	16,900
As cargo	120,000	38,100
Total	240,000	45,000
Consumed as per table.....	242,200	41,600
Margin	6,800	3,400

"The margin remaining as shown is uncomfortably small, and we are at once confronted with the problem of the 240,000 tons of coal and 40,000 tons of oil required to get the ships back to Balboa. The bunker coal for the colliers can be obtained from Singapore or Australia, but only Welsh or Pocahontas coal serves for naval use. The problem, elementary as it may seem, is extremely complicated even in time of peace. What it would be in war is another matter, but it illustrates the profoundly gratifying fact that we have wisely given our ships a large steaming radius and, more wisely still, have gone in for government-owned colliers and supply ships, while every other navy in the world has to rely on chartering. With adequate supplies of coal and oil at Honolulu, Midway and Guam, we may attain the desired mobility of the fleet even in war, provided we adequately fortify Guam and Midway.

"In time of war the high speeds required in scouting and protecting would increase enormously the demand for fuel, and the 10 knots' speed for the fleet shows how narrow is the margin, as it gives the minimum easily increased by leaps and bounds under stress of weather or war operations. It is estimated that probably 200,000 tons of coal would be required along this route in wartime."

Change of Railroad Rates in West Virginia*

By J. W. DAWSON†

SYNOPSIS—The freight increase in West Virginia is for the purpose of relieving the railroads from the necessity of reducing freight rates in Ohio. The writer alleges a conspiracy of the Pennsylvania R.R. and the Pittsburgh Coal Co. against the West Virginia operators.

The proposed change in freight rates is the greatest crisis that has ever confronted the State of West Virginia. It will involve each year more than the Virginia debt, and yet that has been regarded as a critical matter for the state. The coal produced in West Virginia is 50 per cent. more valuable than the agricultural products of the state, and the coal industry annually brings into West Virginia about half as much money as is on deposit in all the banks of the state combined.

The panics of 1907 and other years were caused by a fear on the part of the banks in one section that they would be unable to get any more cash if they let out what they had on hand. If that is true, what would happen if they knew 50 per cent. of their deposits, \$75,000,000 annually or \$250,000 daily, would be cut off next year; yet this is the amount that the coal industry brings to West Virginia, and the shutting off of this inflow of money would create such a panic as has never been seen or dreamed of in this state.

WHAT IDLE MINES WOULD MEAN TO WEST VIRGINIA

But the crisis does not confront only the 450 coal companies, but also in as large or larger degree the 80,000 mine laborers, the 250,000 women and children who are dependent on them, laborers in all other walks of life, the farmer and his laborers, and the wholesale and retail merchants. It will even affect the state by reducing the revenue from taxation.

The 450 coal-operating concerns will be injured to the extent of \$5,000,000; the miners and their families will lose \$55,000,000, or 11 times as much as the operators. About 95 per cent. of the \$75,000,000 for which the coal of West Virginia is sold comes from without the borders of the state. If the coal industry of West Virginia should be destroyed and the railroads of the state thereby lose their largest tonnage and revenues, will not the merchant and manufacturer be required to pay higher freight charges on his wares? And will not passenger rates be advanced likewise to make up the deficit to the railroad?

If West Virginia could have freight rates as favorable as Pennsylvania in marketing her coal, the coal lands of the former state would not then be only worth from \$100 to \$200 per acre while lands in Pennsylvania, containing less valuable coal, are valued at from \$1,500 to \$2,000 an acre. The valuation for taxes in West Virginia would after the change be about \$2,000,000,000 instead of \$1,250,000,000.

*Abstract of paper read before the West Virginia Board of Trade, Fairmont, W. Va., Oct. 19 and 20, and entitled "The Coal Crisis."

†Charleston, W. Va.

Now what threatens the very existence of this business? Not the proposed 15c. advance in freight rates. That is only the last straw that may break the camel's back. The real danger that threatens the state is the illegal combination of railroads and coal operators and coal miners of other states, which has done for years and still is doing everything it can to destroy the coal industry of the state and will, through it, destroy other business in West Virginia.

When the 200,000 or more coal miners and thousands of coal operators of Ohio, western Pennsylvania, Indiana and Illinois meet each two years to discuss wage agreements, much time in their deliberations is devoted to ways and means of "destroying West Virginia's coal industry," and no mention is made of destroying that of other states. This is a matter of record in the printed proceedings of their conventions.

PENNSYLVANIA OPERATORS DESIRE TO CLOSE WEST VIRGINIA MINES FOR 50 YEARS

A few years past one of the principal officers of the Pittsburgh Coal Co. testified before the Interstate Commerce Commission in the lake-rate cases, known as I. & S. No. 26, that "the opening of the West Virginia coal mines was an economic blunder and should have been postponed fifty years." In this he voiced the sentiments of the officials of the Pennsylvania R.R. and most coal operators of western Pennsylvania, Ohio and Indiana, and they will, if they can, close our coal mines for the next fifty years.

Some years past the president of the Norfolk & Western Ry. called into his office the coal operators along his line and told them bluntly that they must increase the price of coal 25c. a ton at the mines or he would increase the freight rate 25c. a ton to Atlantic Coast points for the reason that they were shipping too much coal into New England via Lamberts Point and Atlantic Coast vessels and that they were taking the business and tonnage formerly handled by the Pennsylvania R.R.¹

You will observe no consideration was given to the coal industry of West Virginia or the earnings of the Norfolk & Western Ry., but that the anxiety was to protect the business and earnings of the Pennsylvania R.R. None of us will, I believe, think that the Norfolk & Western Ry. would take such action voluntarily.

Then, about the year 1901, W. M. Page, one of our largest coal operators, desiring to develop valuable coal lands and wishing to have some of his associates in either Baltimore or Philadelphia test the coal, loaded a car of it and billed it out over the Chesapeake & Ohio Ry., and that common carrier refused positively to move this car forward at any price, for the reason that the Pennsylvania R.R. did not permit the Chesapeake & Ohio Ry. to handle coal routed into Eastern cities.

I am wondering if you are conversant with the fact that neither today nor at any previous time in a great many years can coal mined along the Chesapeake & Ohio

¹The president of the Norfolk & Western Ry. Co. in his letter of Nov. 27 emphatically and unequivocally denies having made this statement.

Ry. in West Virginia be shipped into Baltimore, Philadelphia, New York or intermediate cities where it should find the best markets. Not for the reason that the distances are too great. This coal does move into Detroit, Mich., Chicago, Ill., and Minneapolis, Minn., which distances are just as great. Not for the reason that we cannot market coal in territory nearer other coal fields, for West Virginia coal is marketed in and through the coal-producing states of Ohio, Indiana, Michigan and Illinois. But the only reason why our coal cannot be marketed in the Eastern cities is that influence is exerted over the railroads in West Virginia by the Pennsylvania R.R. and its associates to such an extent that our railroads are not permitted to do business where that business will affect adversely the tonnage or earnings of the Pennsylvania R.R.

About the year 1900 the largest railroads, acting with the large coal companies of Pennsylvania, Ohio and Indiana and other large financial interests, directed the principal coal roads of West Virginia to stop by force the development of coal properties in our state, and this policy was undertaken by the roads of West Virginia between the years 1900 and 1904, by tearing side-tracks away from coal tipplers, arbitrarily refusing car supplies, refusing car track and switch connections for new developing mines and by other equally illegal methods until the people became so wrought up and so many complaints had been made to the Interstate Commerce Commission and to the courts that the Pennsylvania R.R. Co., the Pittsburgh Coal Co. and others in this illegal combination realized the necessity of discontinuing for the time being those high-handed practices.

A CONSPIRACY TO CRIPPLE BY FREIGHT RATES

Then, a few years later, this illegal combination finding that it could, and had for years, kept West Virginia coal out of the Eastern cities, conceived the idea of forcing the West Virginia railroads, against the will and judgment of their operating officers, to increase freight rates on coal to the Great Lakes "for the purpose of keeping West Virginia coal out of the Western market." This question was appealed to the Interstate Commerce Commission, with the result that the efforts of the illegal combination were again frustrated.

Now this same combination, believing that the "pendulum had swung back" in favor of permitting railroads to do as they pleased, has mapped out a plan by which it hopes to force West Virginia railroads to apply such unreasonable charges for the handling of our coal that it will be impossible to market our product in competition with Ohio, Indiana and western Pennsylvania.

And in this connection it seems to me the trunk-line railroads are determined not to permit the Department of Justice of the United States or the various state administrations to give them a rest, for it seems that as soon as the public begins to talk in favor of fair treatment of the railroads, the railroads in turn begin the unfair treatment of the shipping public, as in this case.

We should have no quarrel with the coal operators of western Pennsylvania and Ohio for attempting to have their coal rates reduced if they thought them unreasonably high nor with the Pennsylvania R.R. for keeping its rates up if it can, but when these two interests combine to force up West Virginia rates, which are satis-

factory both to West Virginia coal producers and West Virginia railroads, it is high time to fight the increase.

When a few years past the destruction of the coal industry of Ohio was threatened by unwise legislation, the people of Ohio remained indifferent and the "Green anti-screen law" was passed. Then the Ohio railroads, realizing that they might be compelled to lower freight rates, combined with the coal operators of Ohio and western Pennsylvania, and proposed to save the situation by an increase of freight rates on coal shipped from West Virginia. Until then the railroads of West Virginia had not thought of raising freight rates or complained of their being too low.

As an evidence of the fact that the present move to destroy the coal industry of the state is not one involving rates on coal or profits or earnings of West Virginia railroads, or one originating even with the officials of those roads, let us see just what led up to the present proposed demand for higher rates on our products.

CONFERENCE AT WHICH INCREASE WAS PLANNED

A few weeks past an operating officer of the Pennsylvania R.R. and the legal representative of the Pittsburgh Coal Co. arranged with a member of the Interstate Commerce Commission for a conference between them and a "few friends." When the date set for the conference arrived, I am told, there appeared before the Interstate Commerce Commission 11 railroad officials, representing the Bessemer & Lake Erie R.R., the Baltimore & Ohio R.R., the Cincinnati, Hamilton & Dayton Ry., the Chesapeake & Ohio Ry., the Hocking Valley Ry., the New York Central & Hudson River R.R., the Norfolk & Western Ry., the Wheeling & Lake Erie R.R. and the W. P.¹; 7 coal operators representing western Pennsylvania, 4 from the No. 8 District of Ohio, 2 from the Hocking Valley District, 2 from the Pomeroy District; and 27 or more other railroad officials and coal operators of Ohio and western Pennsylvania.

And they met, not with a view of adjusting freight rates on Pennsylvania or Ohio coal or on the Pennsylvania R.R., but to have the rates on West Virginia coal increased.

These gentlemen by argument or written petition attempted to prevail upon the Interstate Commerce Commission to take such action as would increase the rates on coal from West Virginia without increasing the rate on coals from other states, giving as their reason for this action that it was their desire to bring about a condition of affairs that would give to the coal operators and the railroads of Pennsylvania and Ohio better markets and greater profits and prevent West Virginia coal from being profitably mined north and west of the Ohio River.

It should be borne in mind that at this important conference no West Virginia coal operators were invited or were present, even though it was their business and theirs alone which was under consideration.

It should likewise be borne in mind that this conference of the Interstate Commerce Commission did not originate with, nor was it requested by, the representatives of any railroad of West Virginia or any coal operator of West Virginia, but by an attorney for the Pittsburgh Coal Co. and a vice-president of the Penn-

¹Possibly by W. P. is meant the West Maryland Ry.

sylvania R.R. and of the New York Central & Hudson River R.R., thus showing conclusively that the combination was acting in opposition to the interests of West Virginia.

The petition filed with the Interstate Commerce Commission states plainly and shows conclusively that the object of these gentlemen and that move were not to benefit the railroads of West Virginia, but to destroy the coal industry of the state and to cripple hopelessly the railroads of West Virginia.

The Ohio operators, taking advantage of the depression in the coal business during the past year, demanded of the railroads and through the Ohio Corporation Commission¹ a reduction in freight rates on coal within the State of Ohio, giving as a reason that the operators of Ohio could not do business in competition with West Virginia operators under present freight rates, notwithstanding the fact that those rates have been in effect in Ohio and western Pennsylvania for a great number of years and that the year 1913 was conceded to be one of the most profitable years to the coal operators and coal industry of that state.

Moreover the production of coal within the State of Ohio has increased under those rates from 18,988,150 tons in the year 1900 to a tonnage of 36,200,527 in the year 1913, or an increase in 13 years of about 90 per cent. This shows conclusively that the coal industry of Ohio was developing satisfactorily until the "Green anti-screen law" was passed by the Ohio Legislature during the winter of 1913. As I have already said, this law put the coal operator of Ohio out of business.

The operators of western Pennsylvania and Ohio set up the plea that it is necessary to increase freight rates on West Virginia product that they may receive a reasonable price for their coal at the mines, but under the present freight rate and transportation conditions which have existed for years the operators of Ohio receive about \$1.09 for their coal at the mines and those of western Pennsylvania about \$1.12 per ton, while the operators of West Virginia obtain for a much higher grade of coal only about \$1.03 per ton, which would not indicate that it was necessary in the interest of fairness to establish a greater differential in the freight charges on coal mined in these several states.

If the controversy now confronting us was one of railroad revenues or earnings and if the railroads of West Virginia actually needed or claimed that they require additional revenue, the question would be entirely different, but the officials of our railroads would not dare to make any such claim in face of their official reports which have recently appeared in print and which show conclusively that they are earning good profits on their investments.

RAILROADS IN WEST VIRGINIA ARE MAKING PROFITS

Their stock has increased in value many hundred per cent. in the space of a few years; for instance, the stock of the Kanawha & Michigan Ry. was purchased and sold at about 11c. about 16 years ago, while now it is worth and brings on the market about 88, an 800-per cent. increase in value in 16 years, or 50 per cent. a year. I know of no coal company or other enterprise in the state making such a showing. With the Kanawha & Mich-

igan and Chesapeake & Ohio showing a good net earning on stock that represents no original investment and the Norfolk & Western Ry. showing a net earning of about 8 per cent. on stock that was sold and purchased at five and six dollars a share and now sells for 117, West Virginia railroads could not and do not claim they must have higher rates for necessary revenue. The proposed increased rates must therefore be for some other reason.

If by chance the coal operators of West Virginia could continue doing business under this advanced freight rate, it would be necessary for them to decrease the amount of wages paid their employees and curtail expenses in every other way to absorb this 15c. advance in rate. Thus if they continue to ship coal in the same quantities as at present, there would be an annual loss to the state of this 15c. a ton, or about \$11,000,000 annually, so long as this advanced rate was in effect. For the operators of West Virginia do not have it in their power to require the users of West Virginia coal to pay the additional freight charge, as they have no control over the price at which their coal is sold either at the mines or at destination, that being determined entirely by the price at which the customer can purchase coal mined in western Pennsylvania, Ohio and Indiana.

It should be borne in mind during the consideration of this entire matter that it is in no sense a controversy between the coal producers of West Virginia and the railroads of West Virginia, but the contest is really between the State of West Virginia and all its citizens on one side and the Pennsylvania R.R. and the coal operators of western Pennsylvania and Ohio and the State of Ohio on the other side. Therefore every man within West Virginia should enlist in the battle.

WEST VIRGINIA SELLING COAL AT LOW PRICES

It is because of the illegal and criminal combination that West Virginia operators are forced to sell at the mines the best coal in the world at the lowest price in the world. No one will claim, I believe, that this is done voluntarily by West Virginia operators or that they are less aggressive, less intelligent or less capable of coping with market conditions than the operators of other states, but notwithstanding their ability and efforts, their high-grade coal was sold last and previous years at prices which netted West Virginia something like \$8,000,000 less than they would have received for the coal shipped out had they been permitted to market their coal under as favorable conditions as some of the other states, which are now claiming that they are discriminated against by the railroads in favor of West Virginia, which is not true.

I believe this board could not do anything which would benefit the State of West Virginia as much as to employ the best attorney obtainable, who would appear for and in the name of the Board of Trade of West Virginia before the Interstate Commerce Commission and defend this state against this great injustice, and further appear before and demand of the Federal Department of Justice an investigation into this entire question and a prosecution and a conviction if possible of the individual men connected with the Pennsylvania R.R., the Pittsburgh Coal Co. and others for their attempted illegal restriction of the commerce originating in West Virginia and passing into other states.

¹Ohio Public Utilities Commission.

Anthracite Section A. I. M. E.

The Pennsylvania Anthracite Section of the American Institute of Mining Engineers held its fall meeting in Scranton in the clubhouse of the Engineers' Society of Northeastern Pennsylvania on Dec. 4. H. M. Crankshaw, general manager of the Harwood Coal Co., presented a paper on "Mining and Ventilating Thick Pitching Seams." In this he described the methods of working the Mammoth bed which he has introduced at the Harwood colliery and which give a reduction in the cost of extraction, a larger percentage of prepared sizes and an increased recovery.

William Griffith gave a description of the results of tests of models of the mine-roof supports developed by him. These consist of timber cogs filled with concrete. They show great strength and elasticity.

Hugh Archbald exhibited a chart showing the results of some of his investigations into the loss of time at collieries. An investigation of one colliery, extending over a month, showed that the majority of delays in the forenoon were caused by inside troubles, while in the afternoon the larger part of the loss of time was owing to delays in the breaker.

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Freight Congestion at New York

What effect the freight congestion that is enveloping the New York tidewater will have on the coal situation is as yet uncertain, but there is no division of opinion that should the Atlantic coast be visited by severe winter storms the trade will be facing a serious shortage of coal. It is estimated by railroad officials that there are more than 40,000 cars of freight lying on the sidings of the various roads leading to New York. Most of this freight is for export and is held back by the shortage of vessels. Among it are many cars of coal consigned to New York and Philadelphia. It is estimated that one of the large anthracite carriers alone has about 500 cars among the number, and it was also said that about a week ago the Pennsylvania R.R. had 1,800 cars on side tracks waiting an opportunity to move. Shipments along the Baltimore & Ohio were said to be quicker than on some of the other roads.

Shipments from the hard-coal regions, usually requiring an average of three days, now take upward of two weeks. It was also said that some cars of hard coal had been delayed two weeks, although the coal had been for several days within 50 mi. of New York. Shippers of bituminous complain of having boats waiting at the docks for coal. Delay on shipments of soft coal is generally greater than that on hard coal.

Efforts are being made by the railroads to relieve the situation, and to that end a meeting of the presidents and vice-presidents of the railroads reaching New York, Boston, Portland, Philadelphia, Baltimore and Newport News took place in New York last week. The conference appointed a committee of operating officials to deal with the situation. It will seek the coöperation of shippers as well as steamship companies to expedite the movement of export freight.

A committee representing the exporters of the city has also been formed and will confer with the railroad representatives. This committee will make a formal protest to the railroad representatives against the filing of

the notice with the Interstate Commerce Commission that on and after Jan. 1, 1916, the number of days of free storage will be reduced from 30 to 15 days.

Embargoes have been declared by the Delaware, Lackawanna & Western on eastbound freight intended for export, except shipments for which vessels have already been engaged, by the Pennsylvania on all flour and lumber for export or to be lightered at New York and by the Baltimore & Ohio on all iron and steel products for export at New York. In addition it is expected that other roads will inaugurate similar embargoes.

How the railroad officials view the situation is set forth in an address made by George Dallas Dixon, vice-president in charge of traffic of the Pennsylvania R.R., made before the International Trade Conference at the Hotel Astor on Dec. 6, when he said:

The export freight situation which has suddenly developed at the Port of New York is far from satisfactory to the railroads, to shippers and the country generally. The export traffic in the past has grown by leaps and bounds until every transportation company, both rail and water, has found itself unequal to the task of handling it satisfactorily. What will be the situation six months from now if this traffic continues to grow as it has in the past few months? And certainly it is reasonable for us to suppose that it will continue to grow possibly even more rapidly. The American nation must stand ready to help supply the markets of the world, but if we are to do this, we must be prepared.

It is estimated by C. C. McCain, chairman of the Trunk Line Association, that of the 40,000 cars either at the terminals or on the lines consigned to New York, approximately 90 per cent. will require lighterage delivery. Mr. McCain said that no figures that had been submitted showed the number of cars loaded with coal lying between New York and the coal regions.

The Pennsylvania, in a statement issued on Nov. 30, said that at various points in New Jersey there were at that time 2,746 cars of freight for export and lighterage at New York. The Lehigh Valley on Dec. 2 reported having at the New York terminals 3,970 cars of freight undelivered, of which 3,580 cars were waiting for ships. Of these latter, 1,372 cars were unloaded, the contents of 2,014 cars were being held on piers and in warehouses and that of 194 cars had been unloaded on the company's property in Jersey City.

Under date of Dec. 7 the L. V. R.R. issued the following statement:

The Lehigh Valley R.R. has placed an embargo on shipments of the following commodities consigned to New York harbor delivery: Export, domestic and coastwise shipments of hay and straw. Export, domestic and coastwise carload shipments of wire of all kinds, nails of all kinds, iron and steel rails. Export and domestic carload shipments of locomotives and parts thereof, machinery and all iron and steel articles. Shipments of the foregoing will be accepted which are billed before Dec. 7.

The C. R.R. of N. J. at the same time announced:

The Central Railroad of New Jersey has placed an embargo on all export traffic, also on hay and straw, and on locomotives and parts thereof, consigned to all New York deliveries. Shipments of the foregoing billed before Dec. 6 will be accepted.

The committee appointed by the railroad presidents also issued a statement under this date as follows:

The representatives of the several roads advised that there had been an increase of from 400 to 600 cars on their respective lines or at their terminals, as compared with the conditions at the time of the previous meeting. It was ascertained that the embargoes which had been previously announced had relieved certain of the roads only to a limited extent and that the situation as a whole had not been improved and that additional embargoes had been found necessary by the Lehigh Valley R.R. and the Central Railroad of New Jersey.

The Labor Situation

SYNOPSIS—The Rochester & Pittsburgh Coal and Iron Co. closes down the Florence mine as a result of the strike. In Illinois the union decides that the exclusion of militiamen from the mines and the union is unconstitutional. Charles S. Keith testifies at Kansas City that he paid \$20,250 for the purpose of corrupting the union. The Colorado Fuel and Iron Co. publishes the list of causes for which men may be discharged without notice.

The employees of the Lawrence and Stanton collieries in the anthracite region, comprising about 1,000 men, went on strike on Nov. 23 endeavoring to make the Harleigh-Brookwood Coal Co., a Madeira-Hill operation, accede to their demands. When the matter was brought before the conciliation board, the men were directed to return to work in three days. The men are then to present their grievance to the company, and if no agreement can be reached, the questions at issue will be heard by the board at its meeting of Dec. 6. The mines have only been in operation a short time, after being abandoned for several years.

Unions Behind in Special Assessment May Vote

The international officers of the United Mine Workers have declared that no local union shall lose its representation at the international convention in January by reason of unpaid special assessments. On Sept. 1, 1913, a special tax was laid upon all members for the conduct of the eastern Ohio and Colorado strikes. This was operative for two months, but by a referendum vote the assessment was extended and remained in force until June, 1915. Many of the anthracite unions because there was no check-off fell behind in the collection of the special assessment, which amounted to 50c. a month per capita. Some unions are behind \$6,000 to \$7,000, and the men in such unions are glad that their delinquency will not bar their delegates from voting.

The Lehigh Coal and Navigation Co. discovered that Charles Novak, a breaker boss, was selling jobs to foreigners for work under his supervision. He was fined \$50 and sentenced to one year's imprisonment.

Some of the workmen having refused to join the union, 1,000 men in the Beaver Meadow colliery of the Lehigh Valley Coal Co. refused to work with them, and the mine closed down in consequence. After being idle two days, the men agreed to return to work pending an adjustment of the matter.

Florence Miners on Strike Are Locked Out

The strike of the men of the Rochester & Pittsburgh Coal and Iron Co. at Adrian and Florence, referred to in the preceding issue of "Coal Age," still continues. On Nov. 30 Lucius W. Robinson, the president, posted a notice at Florence stating that as the men had gone on strike Nov. 22 he would not attempt to operate the mine during the winter. He called on the men to remove their tools. Mr. Robinson recalls the fact that on the signing of the scale agreement of 1912 the Florence employees refused to work under that instrument for several weeks.

The men get much comfort out of the fact that the company declares it is losing \$500 to \$1,000 a day each day the mines remain idle. They think it is vain for the company to hope that this money will be refunded by the union or the men, and they believe that the assurance of continued loss will make the R. & P. C. and I. Co. anxious to settle. J. P. O'Loughlin, of Clearfield, is the final umpire if the case is submitted to arbitration as the agreement requires.

Attitude of Union to Militia in Illinois

The law forbids any discrimination against men who belong to the state militia. Recently five men were expelled from Local Union 644 for membership in the militia of Illinois, one of the men being a local secretary of that union. This was done under the district constitution, Sec. 26 Art. 14, which states that "any member belonging to a secret-service organization, a private detective agency, the Boy Scouts, the Civic Federation, state militia or National Guard shall be expelled from the United Mine Workers of America."

The men expelled demanded reinstatement in the local, restoration to their positions in the mine and reimbursement from the union for all time lost. Frank Farrington, the

president of the district, recommended that these demands be granted, but the local tabled the paper on Oct. 1. On Oct. 4 the five men caused the arrest of all three members of the mine committee and charged them with five violations of Sec. 4 Art. 23 of the Military and Naval Code of the State of Illinois.

On Oct. 16 a committee appointed by the district executive board of the union visited Hillsboro where the men were expelled and proceeded to consider the situation. It reported on Nov. 1 that Sec. 2 Art. 14 of the International Constitution read: "Mine managers, top foremen, operator's commissioners, persons engaged in the sale of intoxicating liquors and members of the Civic Federation or Boy Scout movement shall not be eligible for membership." They held that the district constitution conflicted with this provision, especially since at the first biennial convention of the United Mine Workers of America the constitution committee was asked to recommend the exclusion of militiamen from membership in the union and refused.

The committee held that Sec. 26 Art. 14 of the district constitution was null and void as far as its references to the militia and National Guard were concerned. This decision while open to much question is the best way out of the difficulty and has been approved by Frank Farrington. The committee declared that compliance with the law was the better plan, that the charges against the union of lawlessness could only be met by circumspection and obedience in this matter and that to violate the law would give the operators an excuse for violating it also.

Large Bribes Offered to the Union in Kansas

Alexander Howat, president of district 14 of the United Mine Workers, is pressing the suit for slander which was noted in much detail in "Coal Age," page 805. Charles S. Keith, president of the Central Coal and Coke Co., of Kansas City, Mo., testified before a commissioner that he had paid \$11,250 on one occasion and \$9,000 on another to obtain a favorable clause in the contract with his miners. Mr. Keith was president of the Southwestern Interstate Coal Operators' Association and paid the larger amount in 1910 and the smaller in 1912. His testimony was that the money was given by him to Joseph H. Hazen, an independent coal operator of Mulberry, Kan., for payment to Alexander Howat and Fred Holt, respectively secretary and treasurer of the Oklahoma district.

The contract clause mentioned provided for an arbitrator to pass on questions between the operators and the employees. Mr. Keith testified that H. H. Holmes, a Chicago detective, had first suggested the means of obtaining the desired clause. He then engaged Holmes to obtain it.

Mr. Keith testified that the money, given in check and currency to Hazen, was advanced by the Central Coal and Coke Co. and later paid back by the association. Testimony somewhat similar to this was given when Mr. Keith was sued at Fort Smith, Ark., by the Bache-Denman interests for an accounting of the association funds. Howat denied that he received the money from Hazen, in depositions which he gave then.

Howat's suit is directed against C. S. Keith, J. H. Hazen, W. J. Jenkins, of the Western Coal and Mining Co., Edward E. Riley and Ira M. Fleping.

Costly Blackmailing of a Miner in Oklahoma

Michael Broshears, a miner, brought suit against the Deimal Coal Co., of Dewar, Okla., which blacklisted him. He was without work from Nov. 27, 1914, to Apr. 1, 1915. The company has been ordered to compensate him for every day the mine worked between those dates. The case has been before numerous arbitration boards and commissions and was finally settled when Judge Evans, of Booneville, Ark., acting as third member of the latest board, decided in favor of the miner.

Offenses Meriting Discharge Without Notice

One of the agreements between the miners and the Colorado Fuel and Iron Co. required that the company should post a statement specifying what offenses would be punishable by dismissal without previous notice. The offenses named are violation of law, changing checks on mine cars or loading out another's coal, theft of supplies, changing working place without orders, willfully loading out slate and other impurities with coal, abuse and neglect of animals, intoxication and bootlegging, carrying detonating caps at mines where shotfirers are employed, indecent or immoral conduct, fighting, carrying concealed weapons, three days' absence without permission, except in cases of illness, and sleeping on duty.

Editorials

Contributory Negligence and Assumption of Risk

Two of the features of our common law we have always looked upon with some suspicion—contributory negligence and assumption of risk. It always seemed that if the employer was in any degree responsible for an accident, he should foot at least a part of the bill, and it appeared also that the workingman was really not always altogether aware of the risk he ran or a free agent in accepting it.

So the new Pennsylvania act removing these common-law defenses looked not by any means wholly illogical and unfair, and it had the merit of shifting the burdens onto the shoulders which were broader and better fitted to bear them. With these pious reflections most of us have been willing to admit that the operator who was little if in any way at fault for an accident should pay the whole bill.

But the Court of Appeals in New York has just reversed a decision of a lower court and has declared that when a man turned up his collar, pulled his hat down over his eyes and tried to cross the street and was run down by an auto truck, the company owning the truck should not pay for the loss. He did not use "ordinary care," they say, which is the same as saying he was negligent in a contributing manner. He also must have assumed the risk, or he would not have attempted to cross the street when express wagons were running.

So the courts revive the old common-law defenses in a peculiarly objectionable manner. No one could find fault with the courts for proving friendly to their favorite counsel, but the interesting matter is that those papers that have unsparingly condemned the common-law defenses in the mine and the mill now look upon them as judgments of Solomon—on the street.

And why? The auto-truck man can as readily avoid hitting the pedestrian as the latter can avoid being hit. The contributory negligence is nearly equal, but the pedestrian is a little less negligent than the auto-truck man, for he cannot watch the auto truck without turning his head, while the driver has a good chance to see the pedestrian, because when the two are near one another, the pedestrian is straight ahead and in full view.

In the mine, however, the negligence of the miner is usually about a thousand times greater than that of the foreman. He should be in his place about a thousand times as long and have many times the opportunity to examine the roof. It is not a case of equal negligence of miner and foreman, but of a trifling failure on the one hand and a gross oversight on the other—if of course there is any negligence at all.

Besides, neglect by the foreman even if proved is not as damning to the employer as his personal neglect. Negligence in supervision is always a smaller negligence by far than one in action, and if the contributory negligence rule is to be wiped out, it should first exclude cases of negligence in action like that of the truck driver and

later extend to negligence in revision and superintendence. But it appears that the public as usual uses horse-sense about its own affairs and sob-sense about the affairs of others.

The public will be a long time realizing that the same thing constitutes justice for the ordinary individual as for the mill owner and the mine operator. The failure to realize this is why domestic servants and agricultural laborers are excluded by the present act in Pennsylvania, and it explains why the whole battery of the common law may be used to break down the plea of a plaintiff injured on the public street, but may not be raised if he is hurt in a mine or a mill.

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West Virginia Freight Rates

Col. J. W. Dawson has written to *Coal Age* criticizing an editorial which appeared on Nov. 6 and declaring that it was erroneous in that it denied that the Eastern coal trade of West Virginia was threatened by the railroads. Colonel Dawson demands that *Coal Age* meet his declaration that the railroads were proposing to raise rates on Eastern traffic as well as on Western. At the time when the editorial was written Colonel Dawson's remarks in full had not arrived at the editorial desk, and the statement of the editor was based on the excellent, though not complete, brief of Colonel Dawson's paper circulated by the West Virginia operators.

But the reader of the abstract of Colonel Dawson's paper, published herewith, will see that according to his statement the threat to add 25c. to the freight rates East dates back some years. The following letter from L. W. Johnson, president of the Norfolk & Western Ry., in answer to a quotation from Colonel Dawson's communication to *Coal Age* carries its own message:

I have your letter of the 17th instant, in which you quote a statement which you claim was made by Col. J. W. Dawson, of Ward, W. Va., as follows: "My address at Fairmont stated positively that the president of the Norfolk & Western R.R. had notified the coal shippers along his line that he would probably advance the freight charges on Tidewater business 25c. a ton to prevent their shipping coal in greater quantities into New England."

If the gentleman made such a statement it is false, and I positively deny having made such a statement as I am accredited with.

The shippers on the Chesapeake & Ohio, Norfolk & Western and Virginian were advised that a change in the bunker rates was contemplated, and at their request a conference was held with representatives of the three railroads. After full consideration, the shippers were notified that the proposed tariff would not be filed. This is all there is of it.

It is obvious that an increase in freights east is not now contemplated, so that the menace greater or less to West Virginia trade applies, as *Coal Age* stated, only to the coal directed west. But Colonel Dawson's fears of a general rise in freight rates east and west justify him in his apprehension that the coal trade of the whole state is threatened with restrictions, though it cannot convince him, surely, that it is approaching complete annihilation.

In fact, as recently as Sept. 13 of this year the shippers of the three railroads mentioned in Mr. Johnson's letter

were advised that the roads contemplated an advance in rates from \$1.40 per gross ton to \$1.50 per net ton, which is exactly 25c. per 2,000 lb. ton. After a conference was held in the Philadelphia office of the Norfolk & Western Ry. it was decided by the carriers that they would not file any such tariff with the Interstate Commerce Commission.

Colonel Dawson likewise objects to the intimation that his line of argument does not receive the support of the bulk of the West Virginia operators. Our surmise that they could not approve it he assures us is incorrect and gives some evidence to prove it. So *Coal Age* is obliged with much reluctance to give up the idea that the operators do not view matters from Colonel Dawson's viewpoint.

Colonel Dawson's remarks to the State Board of Trade on the conspiracy between the railroads and coal companies are interesting. There is no reason to doubt that the personnel of the conference as outlined by him is correct. It is quite likely that the railroads feared that the attack of the Ohio operators on the freight rates in that state would result in wrecking the coal-freight trade in Ohio, which is the best business the railroads have in that and every other state. Rather than see Ohio rates reduced 30c. or 40c. per ton as looked probable, rather than face reductions in other states following Ohio's lead, the railroads probably figured with much wisdom that an increase in West Virginia rates would prove a more desirable consummation than a reduction in Ohio and elsewhere.

Possibly the Ohio operators were summoned to find if they would cease their action before the Ohio Public Utilities Commission if the West Virginia rates were increased and perhaps they agreed. No one seems to know. But certain it is that it would be better for West Virginia to suffer an increased rate of 15c. than to face a 30c. to 40c. decrease in the rates of neighboring states without any countervailing reduction in the "Mountain State."

A smaller reduction in West Virginia would probably take place if the rates were reduced as liberally in Ohio as has been indicated, because West Virginia would be driven quite generally from the market by any such differential, and the railroads of the state would have to meet the attack by lowered freight rates. So the railroads would suffer heavily in Ohio, and almost as heavily in West Virginia, because in that latter state coal is almost the only freight. West Virginia operators would not only lose trade, but the railroads would also lose in their receipts per ton of coal hauled as well as in its gross volume. Clearly the change would be helpful to no one but the consumer in neighboring states, and even he would suffer as he always does when business is done without profit.

Perhaps the West Virginia people losing the railroad earnings formerly spent in that state and losing in the declining profits of the operators also will realize that it would be better to leave the matter of the freight-rate increase where it stood. To do so will hurt only the West Virginia coal operators and not the railroads of the state. But the coal men stand to lose whether freights are raised in West Virginia or lowered in Ohio. If under the new arrangement the railroads in West Virginia are compelled to lower their freights, then both in its railroads and in its mines West Virginia will

feel the effect of the lowering of the freight rates in Ohio. No wonder if the Pennsylvania R.R. estimated that this would be suicidal and preferred to see prices raised. That there was no conspiracy against West Virginia is shown in its readiness, if the report be indeed true, to raise Pennsylvania rates also so that only Ohio will profit. This will bring Pennsylvania operators who have suffered severely from unreasonable rates into the struggle. The Pennsylvania R.R. apparently is acting solely from opportunism. Ohio is wroth and must be appeased; West Virginia is demanding the present differential and must be mollified. So Pennsylvania must suffer.

It is time for Pennsylvania, not embittered or divided but not yet united, to fight for its right to mine coal and to have a ton-mile freight rate which is equitable. Pennsylvania has suffered from West Virginia competition, and now it is assured that Ohio will be hereafter a more formidable competitor than in the past, and such things will always happen so long as the railroads seek the easiest way and do not establish a ton-mile rate based on the costs of transportation.

But Colonel Dawson, who believes there is a conspiracy between the Pennsylvania R.R. and the Pittsburgh Coal Co., will doubtless be much surprised that the railroad in question has been reported as ready to injure the trade of the Pittsburgh Coal Co. by increasing Western freight rates from the Pittsburgh district. This intention, if really true, argues antagonism rather than conspiracy.

The Ohio operators, both east and south, seem well justified in continuing their action before the Public Utilities Commission as it is likely that only there will they obtain relief. As the State of Ohio will be blind to the destitution beyond its borders, it is likely that its action will not be modified by any sympathy for West Virginia miners or operators. It will be more "thorough" in its action than would for instance be the Interstate Commerce Commission with its larger national responsibilities. And yet that commission recently lowered anthracite rates severely, in one case 80c. per ton.

It would seem that West Virginia would feel safer by far in accepting the rates of the railroads which operate through her valleys and which therefore are interested in her welfare than in depending on the action of a commission in a neighboring state which is simply interested in the securing of reasonable rates in Ohio regardless of the effects elsewhere. The cry of such a commission is, "Hew to the line, let the chips fall where they may." What may happen to the railroad and coal business both when the commission gives its decision might spell the word "crisis" in larger letters than the printer of Colonel Dawson's pamphlet has seen fit to employ.

Colonel Dawson and most West Virginia operators believe that the trouble in Ohio is not from the constant freight rates, but from a variable introduced in the end of 1913—the run-of-mine law. But Colonel Dawson says the trouble in West Virginia will be from the constant opposition of the railroads, not from the variable introduced in 1915—the raised freight rate. As a matter of fact the union and the railroads are together to blame for Ohio's fate, and he would be bold who would mark the proportion. Whether Ohio suffers principally from high wages or high freight rates is a matter of opinion on which Ohio and West Virginia can if they are willing go on arguing forever. A wise man will keep free from such an interminable, inconclusive argument.

Sociological Department

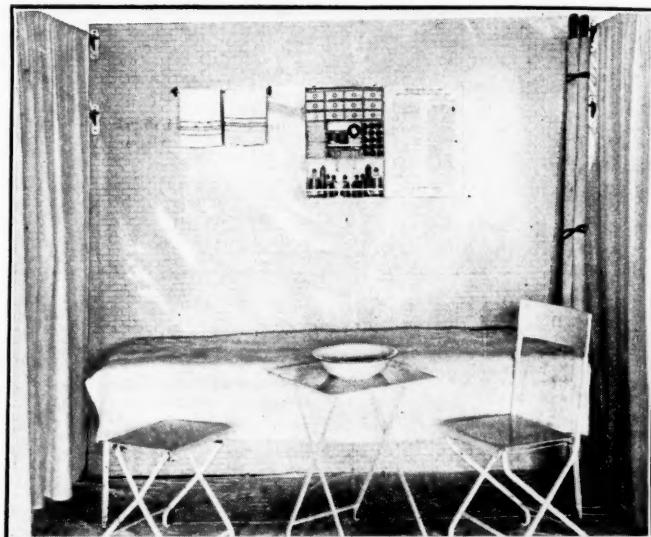
A Folding Cot Room

Where space is lacking, a folding cot room may be installed which takes up when folded an area of only 6 in. by 7 ft. The illustration shows how the room is arranged. The bed folds back against the wall. The chair, the table and the stool can be collapsed so as to make up the minimum space. Two sides of the room are made by curtains that are suspended from swinging rods, and a light pole resting in sockets at the ends of these rods will sustain a third curtain which, with the wall in the rear, will complete the cot room. The chair, table and stool are enameled in white.

There is of course a first-aid cabinet which hangs against the wall. The box consists, not of tin, but of No. 20 gage auto-body steel, electrically welded, dust-proof and suitably enameled. By reason of its strength the case defies injury. As will be seen, at the top are 12 rolls of absorbent cotton, each in its separate sterile case. On the left are 20 separate packages of 6x36-in. sterile gauze. The central portion contains 2 wire-gauze splints, a package containing 5 yd. of 1-in. adhesive plaster, a rubber tourniquet, 6 cotton applicators in a tube and 12 tongue depressors. The rolls in the right mid-compartment comprise 12 1-in., 6 2-in. and 3 3-in. gauze bandages. Passing through slots in the mid-compartment and suspended in these are nickel-plated scissors and thumb forceps.

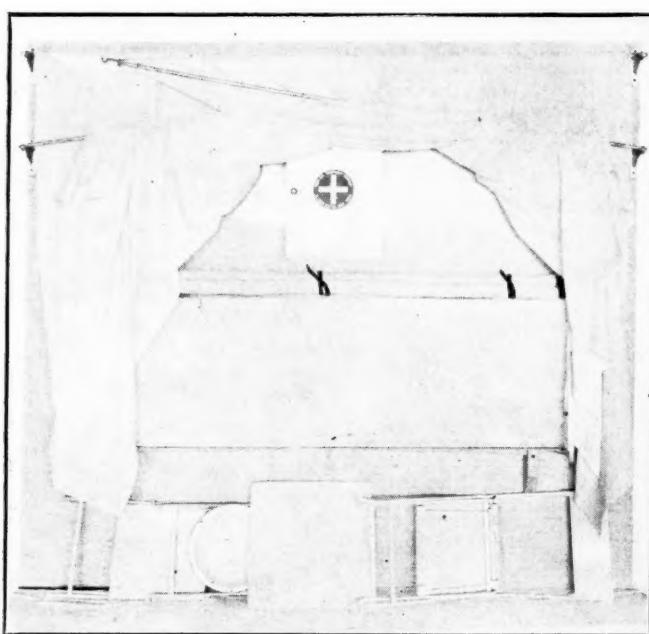
The medicaments at the bottom comprise 2-oz. bottles of 3-per cent. alcoholic iodine, of 4-per cent. boric acid,

Instead of a book of instructions a somewhat complete set of suggestions is fixed to the inside of the lid, at the base of which is space for the resident physician's name, address and telephone number. Great care has been taken



ROOM WITH FIRST-AID EQUIPMENT IN PLACE

to keep all the gauzes separate and sterilized. The folding cot room and its whole equipment are manufactured by the First Aid Equipment Co., of 16 East 23rd Street, New York City.



INTERIOR OF FOLDING COT ROOM

of aromatic spirits of ammonia, of jamaica ginger, of castor oil and 2 3-oz. tubes of burn ointment, composed of vaseline and bicarbonate of soda. A medicine glass and dropper complete the outfit.

Beneficial Fund of Lehigh Coal and Navigation Co.

The beneficial fund of the Lehigh Coal and Navigation Co. dates back to 1884, when the employees contributed \$8,253.61 and the company \$9,351.99. The contributions of both remained reasonably constant, and in 1904 the employees were giving \$11,440.64 and the company \$9,853.66. From that time the employees and company put an increasing amount into the treasury year by year until in 1914 the employees were contributing \$37,962.83 and the company \$29,439.65.

From 1884 to 1914 inclusive the company paid into the fund \$458,253.58 and the employees \$468,253.55. From miscellaneous sources \$47,074.12 was obtained, but \$10,255 was from a sale of securities in 1904. The gross receipts in the 31 years were nearly a million dollars, the actual figure being \$973,581.25. By the present date the million-dollar mark must have been largely exceeded.

Benefits have been paid already to the extent of \$916,898.92, and the miscellaneous expenses have been \$30,111.48, making a total outgo of \$947,010.40. The total benefits and expenditures in 1914 reached \$982,235.40, which left a balance of \$8,654.15 due to the Lehigh Coal and Navigation Co. There was a cash balance in the treasury till 1901. In the years 1902 to 1907 inclusive the fund owed the company money. Then followed three

more years when the fund had a balance, but since 1910 the fund has been in debt to the company from \$6,043.82 to \$9,376.91.

COMPANY PAYS 0.8C. PER TON

The present rules of the fund require the contributions to be made monthly, the Lehigh Coal and Navigation Co. giving 0.8c. for every ton of commercial coal produced by the company, the inside workmen contributing 0.8 per cent. of their earnings and the outside workmen 0.4 per cent. But no workman is required to pay more than \$1 in any one month. All contributing workmen who may be accidentally injured when actually engaged in the service of the company are entitled to the following benefits:

If the disability lasts more than a week, the injured shall receive half the wages of the class of workmen to which he belongs for a period not to exceed 6 months for any one accident. If, however, the physician of the fund certifies under prescribed regulations that the accidental injury is such as to disable the employee from performing any regular occupation that will enable him to earn half the wages of his class of workmen, then the person so disabled may in the discretion of the trustees receive a sum that will bring his earnings up to an amount not to exceed one-half the wages of his class of workmen for each month of such disability for a period of not more than 24 months from the date of the accident. Claims for benefits not made within 12 months from the date of the accident are considered as absolutely lapsed.

In case of an injury resulting in death, \$50 is paid for funeral expenses, and as in case of injury, a sum equal to half the wages will be paid for 18 months from the date of the accident to the widow, orphans or dependent relatives of the deceased or relatives on whom the deceased was dependent, payment being made to any, all or either of them as the board of trustees elects. If there is no widow, orphans or dependent relatives of the deceased or relatives on whom the deceased was dependent, the benefits lapse and the amount remains as a part of the beneficial fund, but so much as is requisite for funeral expenses and proper costs incident to the disability by accident is paid by the trustees. The rules require that when a contributor is killed, notice in writing of the existence of beneficiaries must be served on the trustees within 12 months after such member's death. If this is not done, the nonexistence of such beneficiaries is treated as conclusive and the benefits are regarded as absolutely lapsed. The rules also provide that no disability shall be compensated by more than \$50 per month.

STRINGENT RULES FOR THE PROVING OF CLAIMS

Benefits are paid only if the foreman of the work at which the employee was injured files with the trustees a certificate signed by him stating the time at which the accident occurred and the fact that the man injured was engaged at that time in the service of the company. Moreover, the physician of the fund must file a certificate with the trustees stating that the accident is such as to disable the man injured or, in case of death, that the cause was not disease but accident. If, however, the man injured feels himself aggrieved by the refusal of the foreman or the physician to sign the necessary papers, he has a right to appeal directly to the board of trustees.

All money paid into the fund must be placed in charge of the board of trustees, which is appointed from time to time by the president of the company, who is requested to choose it partly from the officers of the company and in part from business men of experience and reputation in or near the mining region. The board is required to publish a report of receipts and expenditures at least once a year, and the members receive no pay for their services.

The rules provide that the physicians of the fund shall be appointed from time to time by the vice-president of the Lehigh Coal and Navigation Co. from the practicing physicians in the region. No charge is made for certificates, and the contributors to the fund engage and pay such physicians as they select.

The workmen all contribute to the fund, principally on account of the low benefits assessed. The employees of at least one other company have petitioned to have a similar fund started. But no workman is compelled to contribute to the fund, and after any semimonthly pay he can apply at the Lansford office of the company and receive the sum deducted from his pay. Thereafter no deduction will be made, the man's name will be stricken from the roll of the contributors, and he will not be entitled to any benefit till he has made another payment.

The fund is believed to be ample to meet all claims likely to be made upon it. If, however, it is found that the benefits can be increased, the trustees will have power to make the change.

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Compensation Notes

The Iowa act relating to employers' liability and workmen's compensation has been declared constitutional by the Iowa Supreme Court in a decision rendered in the case of George Hunter, a coal miner, against the Consolidated Coal Co., appellant, of Colfax, Iowa. The ruling of the lower court was reversed, the Supreme Court declaring that the coal company had the right to introduce evidence that it was blameless for the injury to Hunter.

Hunter was an employee of the coal company and was injured by a fall of coal while in that employment. The case was tried in the Jasper County District Court, which held that Hunter was entitled to \$100 as damages with interest at 6 per cent. from July 24, 1914. The coal company appealed from this decision, alleging that the new employers' liability law under which the award was made was unconstitutional in that it took away from the employer his right to prove to a jury that he was in no way to blame for the accident.

In the lower court Judge John F. Talbott ruled that the coal company could not make such a showing and denied the defendant a jury. The Supreme Court held to the contrary, however, and declared that under the new liability law of Iowa the employer is not precluded from making this defense, pointing out that the lower court erred in not permitting the coal company to come in and give evidence to a jury that it was not at fault. The case was remanded for a new trial on that point.

The Supreme Court says that the employer has the right to defend his case by showing that he was in no wise at fault for the injuries which the miner has sustained and which he charges are the fault of the defendant. In deciding that this defense is forbidden by the act the trial court erred, and for that reason the decision must be reversed. The case is remanded to enable the appellant to make such defense, assuming the burden of proof thereon, and to plead contributory negligence by way of mitigation of damages if advised to do either. In all other respects the decision below was held to be right and the validity of the statute under consideration was affirmed.

The Supreme Court pointed out that the lower court put a wrong construction on the law when it refused to permit the coal company to present evidence before a jury that it was entirely guiltless and that the injury was the result of the plaintiff's own negligence. The opinion, which filled 90 typewritten pages, is the longest ever filed in the Iowa Supreme Court.

Discussion by Readers

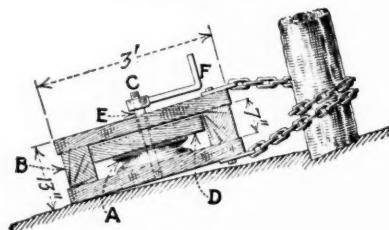
Handling Cars on Pitches

Letter No. 3—Referring to the recent discussion of the methods of handling cars on pitches and in response to the inquiry of Mine Superintendent, *Coal Age*, Oct. 23, p. 687, I am glad to describe for him what we called a "McGinty wheel," which was mounted in a block and chained to a post set at the head of the incline, as shown in the accompanying figure.

In this description I assume a moderate inclination of the seam, the mine being opened by means of a slope driven on the full dip of the strata. Levels or gangways are driven to the right and left of this main slope, and the "McGinty rooms," as we called them, were driven to the rise off the gangways. The success of this method depends on keeping the rooms straight and maintaining a good track. In the case I have in mind, the rooms were driven up as stalls with wide pillars between them, the crosscuts being driven from each room so as to meet about halfway in the pillar. This was necessary in order to reduce the distance of handling the coal in the long crosscuts where no track was laid and cars could not be taken.

When a room was first turned, and until it was driven up about 60 ft., a snubbing rope was used to lower the cars to the level. A post was then set at the head of the room and a McGinty block employed to lower the cars as the room was advanced beyond this point. A double track was laid in each room to permit the empty car going up to pass the loaded car coming down.

The McGinty block shown in the figure consists of an iron sheave *A* 15 in. in diameter and 4 in. wide, having a groove 3 in. deep in its face. This sheave is supported in a strong wooden frame *B* made of 3x12-in. plank. An iron pin *C* 1½ in. in diameter and 18 in. long passes through the center of this block and holds the sheave in place. The pin is prevented from turning by a ½-in. bolt that passes through the sole-piece of the block and a hole bored in the pin, as indicated in the figure. A screw thread is turned on the upper end of the pin to receive the brake handle *F*. As this handle is turned, its shank bears down on a collar or sleeve *E* that surrounds the pin *C* and which, in turn, presses against the brake-block *D*, which serves to control the speed of the wheel and the descending cars. The pipe section *E* is 2 in. in diameter and about 6 in. long. As shown in the figure, the McGinty block is secured to the post by a strong iron chain. The post itself is set in hitches cut in the roof and floor and is tightly wedged. This post is moved up as the face is advanced every 4 or 5 yd.



"McGINTY BLOCK" FOR SELF-ACTING INCLINES IN ROOMS

The first rope used in a room is about 150 ft. in length, the surplus length being wound in a neat coil and laid on the car. When the room is advanced a sufficient distance, another coil 250 or 300 ft. in length is substituted for the old one, which is used in shorter rooms, as required. The length of the second coil is adjusted to the distance the rooms are expected to be driven. This system answers well on pitches varying from 7 to 20 deg.

R. J. BROWN.

Fernie, B. C., Canada.

Average Working Days in Coal Mines

I have been interested in reading the editorial in your issue of Oct. 30, page 715, on the loss of wealth resulting from idle time in the coal mines of the United States, and I note that you have picked out two particularly horrible examples—namely, Arkansas and Oklahoma—as having worked only 174 days during 1913, or about 55 per cent. of the possible working time.

Would it not have been pertinent in this connection to have quoted what has been effected in the anthracite region of Pennsylvania since the operating companies established the custom of allowing the spring discounts. This custom was adopted in 1901 and was for the purpose of inducing consumers to purchase their supplies for the following winter during the discount months when ordinary demand is light and when operation and transportation are not liable to interruption by inclement weather. It was believed, and results have proved the accuracy of the belief, that this would also tend to a more even distribution of the working time throughout the year, so that there would not be so much idle time during the summer and a feverish attempt to keep up with the demand in the winter, with its "peak load."

The reports of the United States Geological Survey show how this scheme has worked out to the benefit of the mine employees. In the 10 years from 1892 to 1901 the average time worked in the anthracite region was 179 days, the fewest days in one year being 150 in 1897 and the largest number 198 days in 1892. The year 1902 is eliminated from the comparison because of the protracted strike in that year, but from 1903 to 1913 inclusive there was only one year in which the average working time fell below the best year in the earlier period.

In 1906, when a suspension of about 60 days pending the renewal of the wage contracts took place, the average number of working days was 195. This was in fact the only year in which the average working time fell below 200 days, whereas in the earlier period there was no year in which as many as 200 days were worked. From the minimum in 1906 of 195 days, the average ranged as high as 257 in 1913, with a mean average for the entire period of 220 days. The average working time since 1903 has exceeded that of the 10 years preceding 1901 by 41 days, or 23 per cent.

To what an extent this has equalized the distribution of the shipments throughout the year is shown by the fact that, in 1913, 50.3 per cent. of the shipments were sent out during the winter months and 49.7 per cent. in the summer months. During the five months of 1913 that the discounts were in effect, the shipments from the region were 28,789,730 tons. Of this amount the sizes above pea that were subject to the discounts amounted to 61.6 per cent., or approximately 17,740,000 tons. As the average reduction per ton during the period was 30c., it can be easily deduced that these concessions cost the operating companies approximately \$5,320,000.

E. W. PARKER, Director,
Anthracite Bureau of Information.
Wilkes-Barre, Penn.

Labor in Mining

Letter No. 11—The discussion brought about by Hugh Archbald's article entitled "Why Are Strikes at Coal Mines of Such Frequent Occurrence?" *Coal Age*, July 24, p. 124, shows this to be a vital subject at the present time. The discussion also shows how unanimously the present practices of the United Mine Workers are condemned. I think, however, that those who have discussed the subject have failed to realize, or at least to bring forward, the fact that the union of mine workers has accomplished one aim for which the organization was formed. The primary object of all labor organizations is to increase the rate of compensation per unit of effort, and this has quite generally been accomplished, though usually with loss to the individual.

The average mine superintendent does not object to paying his men high wages. Indeed in some cases, as has been shown, operators have been compelled by the existing wage scale to pay a lower rate for a certain class of labor than they otherwise would. But with the growth of the union and the increase of its power and influence, its officers have adopted many practices that are obnoxious. As S. A. Driver points out in his letter, No. 8, Aug. 28, p. 349, operators do object to the mine workers depriving the owner or his agents of the right to hire and discharge their employees at will. I recall two instances that occurred in my own experience as superintendent of mines in the Southwest, which illustrate this point.

STRUCK A LARGE FEEDER OF GAS

The Mammoth No. 1 mine was our second largest producer. The mine was quite gaseous, and it happened that in driving the sixth-west entry we passed through some faulted coal that developed a strong feeder of gas at the roof. This died out, however, in a few days and was not considered dangerous until a cold spell in December, when so much gas was given off as to give a good cap in a Davy lamp. By the construction of a temporary wooden bridge the entire air current was carried past this point in the hope of diluting and rendering harmless the gas coming from the feeder.

On the morning following the building of this bridge I drove out to the mine and, after talking over the matter with the mine foreman and fireboss, decided that it would be unsafe to work the entry in by of where the gas was given off, except with locked safety lamps. Not having sufficient lamps to give the men, I directed the fireboss to order them out of the entry until the lamps could be

obtained. The fireboss did this, walking down the entry to the sixth-west parting, where he established a "deadline."

DEMANDED THE DISCHARGE OF THE FIREBOSS

It so happened that the fireboss was *persona non grata* to the pit committee at that time, and the men demanded his discharge, claiming that he had "deal-lined" the entry while the men were still at work therein and that he was therefore "incompetent." Upon my refusal to comply with their request, the miners came out on a strike which was clearly a violation of the union contract. In response to my arguments the union officials said that they would not take the responsibility of ordering the men to return to work under a fireboss who they claimed was incompetent. The state mine inspector being called into the controversy advised me to discharge the fireboss, although he would not openly say that he regarded him as incompetent. As this occurred in the midst of the busy season, the company was rightly demanding coal.

I reasoned that my only excuse for discharging the fireboss would be to say that he was "incompetent," which would mean practically the breaking of the man for holding a similar position in the future. After due consideration, I absolutely refused to grant the men's demands, and following three weeks of idleness, they returned to work under the same fireboss.

DEMAND FOR REINSTATEMENT OF ONE DISCHARGED

About six months later the mine foreman discharged the son of this fireboss for alleged carelessness and impudence. In the meantime the pit committee had been changed, and the new committee was now friendly to the fireboss, whose influence resulted in a strike being called, the men demanding the reinstatement of his son. These incidents show the desire of the union to control the employment and discharge of employees of the company at will.

Another incident of a slightly different character illustrates the same point. It occurred at another mine of which I had charge, in the Southwest. The boiler plant at this mine was in bad shape, the boilers were all over 20 years old and much weakened by the fact that the feed water used was strongly acid and a poor quality of slack was burned under the boilers. The conditions at the mine were such that none of these defects could be remedied at the time. The company had but one fireman who could keep steam while the mine was running. He was an exceptionally good man who took an interest in his work and was ambitious to learn.

OBJECT TO FIREMAN'S RUNNING AN ENGINE

It had always been the custom at this mine for the hoisting engineer to keep the machinery in repair during idle days and Sundays. This work frequently took him into the mine, and at such times the fireman ran the cage, lowering and hoisting the engineer as required. The fireman was willing and eager to do this, as he hoped eventually to have an engine of his own to run. Strange to say the union objected to this slight matter on the ground that the fireman did not receive engineer's pay while running the engine, although the time when he was thus employed did not amount to one hour a week and the fireman himself had never requested engineer's pay. As the result of the demands of the union, the

engineer was forced to climb up and down the shaft when his work called him below. It was frequently necessary, however, to take down a water-end or other heavy part of the pump, and at such times the fireman went down on the cage and the ash wheeler took his place firing in the boiler room.

Even then the union was not satisfied and decided that their "brother" (the fireman) must pay \$50 into the treasury of the local if he wanted to work longer in the mines. It is needless to say that the fireman regarded this as outrageous, and not wanting to settle down to the life of a fireman, he resigned his position and went to work on a farm.

H. P. SWEENEY.

Malcolm, N. S., Canada.

¶

"Dont's" for Mine Motormen

I would like to add two very important "Dont's" to the list given by James Thomas Reynolds, *Coal Age*, Nov. 20, p. 840. They are the following:

Don't stop your motor or trip where it is possible for another motor or trip to run into it, except at a regular station, without going or sending someone back to warn a following trip of the danger.

Don't run by a regular meeting place because the other trip does not happen to be there, without orders from someone in authority or positive and reliable information that the other trip is not coming.

Knoxville, Tenn.

EDW. H. COXE.

¶

Prohibition and Welfare Work

Letter No. 6—I remember that C. J. Fuetter, in his Letter No. 4, *Coal Age*, Oct. 2, p. 560, offered a friendly criticism of my statement made in a previous letter, Aug. 28, p. 350, to the effect that "I am inclined to think that there is a certain amount of coddling indulgence permitted in our welfare work among the foreign-speaking miners."

Mr. Fuetter asserts that his experience has taught him that the foreign-speaking miner has no greater desire to be "coddled" than the American miner. His experience may warrant him in arriving at that conclusion, but surely it does not coincide with the well-known practice peculiar to foreigners of showering gifts of fruits, vegetables, wines, etc., on their superiors. In this connection I am reminded of an instance where a general superintendent was obliged to refuse to accept a valuable diamond ring offered him for his wife by an Italian holding a fairly good position under him. The motive in bestowing these gifts may be an expression of gratitude rather than a desire to obtain unmerited favors, but whatever the ulterior motive may be, it is not American in spirit, does not conform to American ideas and should not be countenanced in any form or instance.

AIMS AND PURPOSES OF WELFARE WORK

The mission of genuine welfare work, as I understand it, is to replace in the foreigner with whom we labor and live the old-world habits and ideas that are not consistent with our methods, giving him instead principles of action that will put him on an equal plane with the best in American citizenship. If this is the proper conception of welfare work, how can its aims be better accomplished than by giving to each man a full and complete

understanding as to what is expected of him, helping him to acquire the necessary ability to perform his duties and thus standing him on his own feet.

I readily agree with Mr. Fuetter that there is yet much to be desired in the way of welfare work in West Virginia, but my experience with the present forms already existing convinces me that there is little or none of the class distinction of which he speaks. I will cite one or two instances that have come under my observation: At Decota, W. Va., there used to be regular Y. M. C. A. night classes, to which foreigners and Americans belonged. As an incentive to membership and attendance, an occasional supper was served, at which times the general manager, superintendents and other mine officials would rub elbows with their drivers, miners and any other white person who cared to attend.

MUSIC AS A MEANS OF SOCIAL UPLIFT

At another West Virginia mining town there is a band composed of 21 pieces, eight of which are played by foreigners, and some of these men have shown exceptional musical talent. The director of this band, an accomplished musician, is an official of the operating company and willingly devotes his time to this work without remuneration of any kind.

Such social intermingling as this surely shows a democratic spirit, and as these people are of a very assimilative nature, its results are soon visible, and the good effect is shared by the entire community.

An eminent engineer in speaking on this subject used the following quotation: "Sow a thought and you reap a habit; sow a habit and you reap a character; sow a character and you reap a destiny."

F. S. JOHNSON, Chemist,
Coalton, W. Va.

Davis Colliery Co.

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Efficient Mine Foremen

Letter No. 13—I read with much pleasure the letter of Wm. Crooks on this subject, *Coal Age*, Sept. 4, p. 394, and can say that the time will not be wasted by anyone reading the same. It recalled to mind the time when I worked in the mine of which Mr. Crooks took charge when it was very much run down by reason of the man who preceded him having spent most of his time in the tophouse. So bad was the condition of the mines that the men could not work more than half a day. In a short time, however, the conditions were so improved that the miners worked all day and came out in the evening, remarking on the good condition of the air in the mine.

GOOD AIR STOPPINGS SHOW FOREMAN'S EFFICIENCY

This reminds me of another incident in my own experience: I took a position as trackman and brattice-man in a mine where the air was very poor owing to leaky stoppings. Being sent to repair these stoppings, I found no lumber and suggested to the boss that he let me build rock stoppings, as there was plenty of refuse at hand for that purpose. He replied that he did not want any rock stoppings as they gave too much trouble.

After waiting a long time for the lumber, the air became so bad that men could not work long in their places. Others were hardly able to get home after coming out of the mine. The boss wanted to know what was the matter, and I took him into the mine to show him where the air was leaking through the board stoppings.

After some persuasion, he allowed me to build a few rock stoppings, on my promise not to draw any pay for the time if the results were not satisfactory. I built the stoppings, packing them well with fine dirt so as to make them air-tight. The result was that in a short time there was good air at the face. After that I was given the position of fireboss, but when the foreman wanted to make a change and have me build brattices at the same time, I looked around for another place.

WHEN A MINE FOREMAN IS NOT RESPONSIBLE

In a neighboring mine where I found employment the foreman had so large a territory that he could not give it the proper attention, and the work he ordered was not half done, as the men were inclined to do very little when not watched. As a result, in this mine also, the air current was almost completely lost before reaching the face. The foreman applied to the manager for an assistant. Although it was evident that there was more work than one man could look after, hoping to save expense the manager refused to give the foreman the assistance he needed.

Later, when an assistant was appointed, the condition in the mine was such as to require two assistants to look after the work and see that it was properly done. I hope to live to see the time when there will be a law restricting the foreman to the charge of a single opening.

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Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

AIR

Little was known of the aerial envelope that surrounds the earth, until the researches of Cavendish and Priestley in England and Lavoisier in France, in the latter part of the 18th century showed that air was **not an element**, as had been supposed, but a mechanical mixture of gases.

Up to this time, air and all combustible material was believed to contain a certain substance called "**phlogiston**," which escaped as flame when the substance was burned. Both Cavendish and Priestley held this phlogistic theory even after they discovered the complex nature of air. Hence, the name "dephlogisticated air" was applied to oxygen; while hydrogen was called "inflammable air" and carbon dioxide "fixed air."

It remained for Lavoisier to expose this fallacy by showing that no matter was lost, but the weight of the products of a combustion was equal to that of the combustibles burned. A large number of carefully made analyses showed a practically constant proportion of the two chief gases of which air is formed. This seemed to suggest that the oxygen and nitrogen of the air were chemically united, although the proportion of each gas did not correspond to its combining power as determined by the analyses of well-known chemical compounds. The character of air as a **mechanical mixture** thus became definitely established.

Besides the two principal gases oxygen and nitrogen that constitute the air we breathe, there are other gases whose presence in the atmosphere is of much vital importance, although their proportion is small. Of these may be mentioned carbon dioxide, water vapor, ammonia, argon and ozone.

Carbon dioxide is most important, because of its toxic effect on the human system. This effect, it is stated on the highest authority, increases with the barometric pressure. Thus, for example, air containing but 1 per cent. carbon dioxide, at a pressure of 4, 5 or 6 atmospheres produces the same effect on the respiratory organs as air containing 4, 5 or 6 per cent. of the gas at a pressure of 1 atmosphere. In other words, the **true gage** of the effect of this gas in inspired air is the percentage of the gas multiplied by the number of atmospheres.

Water vapor present in the atmosphere breathed has a marked effect on the vital activities and the consequent development of physical energy in the body. In what manner the relative humidity of the inspired air operates to impair the physical force has not been fully explained; but experience has shown that a high degree of humidity in a warm atmosphere or climate has an extremely weakening effect on the human system.

The association of **high humidity and temperature** marks a comparatively large amount of water per unit volume of air and, to that extent, it may be assumed impairs the respiratory functions of the lungs. The result is to incapacitate men exposed to such conditions and render them wholly or in part unfit to perform the required manual or mental labor. These effects are continually observed in the warm moist atmosphere of deep mine workings and other similar places.

In the case I have just cited it was not the foreman's fault, but the manager was to blame for not giving him the help needed. Under these conditions a good mine foreman will generally give up his place rather than be responsible for permitting the mine to run down while in his charge.

NEED FOR EVERY MAN TO DO HIS DUTY

In conclusion, I want to say that if every man in the mine would do his duty it would be comparatively easy for a foreman to handle a large territory. Experience shows, however, that the majority of miners will slight their work in order to make it appear that they complete a job in less time than other men. When such work is inspected, it is generally found that it will cost more to remedy the trouble than it would have cost to have done the work properly in the first place. If the foreman spends much of his time in the tophouse and leaves work that he should look after in the hands of his assistant, which is often the case, he is responsible for the poor work done, since the assistant devotes the most of his time in that case to putting out the coal, which he knows will please the foreman. In order to determine, therefore, whether a mine foreman is efficient, it is necessary to watch the daily operation of the mine closely.

Warrior, Ala.

L. J. WRIGHT.

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The Coal Age Pocket Book

The Respiratory System—Respiration is the prime means of maintaining the vital action in animal organisms. Its objects are twofold: 1. The **oxidation** of the organic matter of the animal tissues with the resulting development of vital energy. 2. The **removal** of the carbon dioxide produced in the process of oxidation. Both of these processes are performed through the medium of the blood.

The Circulation—Under the action of the respiratory system, the blood flows from the heart into and through the arteries of the body, as water flows through a circulating pipe system under the action of a pump. The pulsations of the heart, corresponding to the strokes of the pump, force the blood through a complex system of arteries and veins to every portion of the body and limbs.

All the blood does not flow in a continuous circuit, but the arteries branch, forming separate channels leading to different parts of the body. The time required to complete a circuit and return to the heart is obviously widely different, varying from 20 or 30 sec. to one-fourth as many minutes. This is of interest in relation to the time required for poison entering the blood to be disseminated throughout the system.

Respiratory Action—The action known as "breathing" originates or, at least, is regulated by a nerve center at the base of the brain from which impulses are transmitted through the spinal column to the respiratory muscles. By this means air enters the air cells of the lungs and oxygen, absorbed therefrom by the red corpuscles (haemoglobin) of the blood, is carried by the circulation to the tissues of the body, where it is consumed with the production of carbon dioxide. This gas is absorbed by the blood and carried back through the veins to the heart and lungs, where it gives up a portion of its gas, which enters the lungs and is expelled by each succeeding exhalation.

While air expired by a healthy adult, at rest, contains from 2 to 3 per cent. carbon dioxide, careful determinations show a constant production of 5.6 per cent. of this gas in the lungs when the person is at rest.

Quantity of Oxygen Consumed in Breathing—A man at rest consumes 263 cm.³ of oxygen per min., or $263 \times 0.06102 = 16$ cu.in. per min. and exhales an equal volume of carbon dioxide. Air exhaled from the lungs contains 2.6 per cent. carbon dioxide, 18.3 per cent. oxygen, 79.1 per cent. nitrogen. In violent exercise, a man consumes from eight to nine times the amount of oxygen required when at rest; or, say 128 to 144 cu.in. per min. The exhaled breath may then contain 6.6 per cent. carbon dioxide and only 14.3 per cent. oxygen.

Depletion of Oxygen in Air, Effect on Life—Air containing 3 per cent. carbon dioxide can be breathed without discomfort, even when the oxygen content has been reduced to 16 per cent.; but 5 per cent. carbon dioxide causes headache, dizziness and nausea, after a short time. When no carbon dioxide is present in the air the oxygen content may fall as low as 14 per cent. before much difficulty is experienced in breathing; but air containing but 10 per cent. is no longer breathable; but will cause death quickly by suffocation.

Inquiries of General Interest

Calculation of Relative Humidity

Will you kindly give me a formula or explain a practical method for calculating the relative humidity of air directly from the readings of the wet- and dry-bulb thermometers, without the use of hygrometric tables. I am familiar with the method of calculating the relative humidity of air from the saturated-vapor pressures corresponding to the hygrometric readings, but this necessitates reference to the tables, which I wish to avoid. Say, for example, the dry-bulb reading is 70 deg. F. and the wet-bulb 63 deg. F. Is it possible to calculate the relative humidity of the air directly from these readings without referring to the tables I have mentioned?

Cokedale, Colo.

MINER.

In estimating the degree of humidity of the atmosphere from the readings of the hygrometer, it is customary to use hygrometric tables which show the saturated-vapor pressures at different temperatures. In the use of this method the actual vapor pressure for any degree of saturation or any dry-bulb reading is first found by dividing the difference of the two readings by a constant 88, multiplying the quotient by the ratio of the barometric reading to the average sea-level barometer (30 in.) and subtracting this product from the saturated-vapor pressure corresponding to the wet-bulb reading. This is expressed by the following formula:

$$p_v = p_w - \frac{B}{30} \left(\frac{t_d - t_w}{88} \right) \quad (1)$$

The relative humidity H is then found by multiplying the actual vapor pressure p_v by 100 and dividing by the saturated-vapor pressure corresponding to the dry-bulb reading taken from the tables, as expressed by the formula

$$H = \frac{100 p_v}{p_d} \quad (2)$$

Applying these formulas to find the relative humidity in the case cited by the correspondent and assuming a barometric pressure $B = 30$ in., the saturated-vapor pressures corresponding to the dry and wet readings, as taken from the tables, are $p_v = 0.7335$ and $p_w = 0.576$, the corresponding temperatures being $t_d = 70$ deg. F. and $t_w = 63$ deg. F. For the actual vapor pressure we then have, from formula 1,

$$p_v = 0.576 - \frac{30}{30} \left(\frac{70 - 63}{88} \right) = 0.576 - \frac{7}{88} = 0.4964 \text{ in.}$$

Then, applying formula 2 for the relative humidity, we have

$$H = \frac{100 \times 0.4964}{0.7335} = 67 \text{ per cent.}$$

No formula has as yet been published, to our knowledge, by which the percentage of humidity can be calculated directly from the wet- and dry-bulb readings of the hy-

grometer without reference to the tables previously mentioned. We would suggest, however, that fairly approximate results can be obtained for sea-level readings by the use of the following formula, though it requires a knowledge of logarithms, owing to the decimal exponent. In this formula the 0.84 power of the difference of the readings is divided by the dry-bulb reading and the quotient obtained multiplied by the absolute zero of the Fahrenheit scale. The resulting product subtracted from 100 gives the percentage of moisture or the relative humidity of the air. Thus,

$$H = 100 - 460 \frac{(t_d - t_w)^{0.84}}{t_d} \quad (3)$$

Assuming sea-level observations (bar. 30 in.) and substituting the values previously given, $t_d = 70$ deg. and $t_w = 63$ deg., we have for the relative humidity,

$$H = 100 - 460 \frac{(70 - 63)^{0.84}}{70} = 66.3 \text{ per cent.}$$

Again, assuming a sea-level barometric pressure of 30 in. and hygrometric readings, $t_d = 65$ deg. and $t_w = 45$ deg., and finding the relative humidity corresponding to these readings by formulas 1 and 2, since the corresponding saturated-vapor pressures taken from the tables are $p_d = 0.6176$ and $p_w = 0.2995$ in., we find for the actual vapor pressure, applying formula 1,

$$p_v = 0.2995 - \left(\frac{65 - 45}{88} \right) = 0.0733 \text{ in.}$$

Then applying formula 2, we find the relative humidity,

$$H = \frac{100 \times 0.0733}{0.6176} = 12 \text{ per cent., nearly.}$$

Finding the relative humidity in this case by the use of formula 3, as proposed, we have

$$H = 100 - 460 \frac{(65 - 45)^{0.84}}{65} = 12 \text{ per cent.}$$

The formula (3) given above is in no respect a rational formula, but has been derived by observation of hygrometric tables and gives a fairly close approximation to the percentages of humidity obtained by the use of the tables, while the calculation is much shorter. As stated previously, however, formula 3 can only be applied to sea-level observations.

The question of the effect of barometric pressure on the relative humidity of air is an interesting one and worthy of careful scientific investigation, with a view to developing a rational formula that will enable the calculation of the relative humidity of the atmosphere directly from the wet- and dry-bulb readings of the instrument. It will be observed, in this connection, that formula 1 is not a rational formula, since it depends on the empirical constants 88 and 96, the latter being used for dry-bulb readings below 32 deg. F.

We would be glad to have readers of *Coal Age* give this question careful consideration and send us the results of their investigations, as the question submitted is one of practical interest to all engaged in mining work.

Examination Questions

Tennessee Examination Held at Knoxville, Nov. 23-25, 1915

(Selected Questions)

Ques.—What is a creep as applied to coal mines?

Ans.—A “creep” in coal mining may be described as a peculiar movement or disturbance of the strata overlying the mine workings from which the coal has been extracted without leaving sufficient pillar coal for the support of the overburden or without providing for the gradual settlement of this burden on the waste material stored in the space from which the coal has been taken.

Creep is manifested by the “nipping” or chipping off of small particles of coal from the upper portion of the pillars close to the roof. As the creep proceeds, the pillar coal becomes more or less crushed. Timber sets are crushed and broken like pipe stems, with the progress of the creep. Where the pillar coal is hard and the bottom soft, creep is manifested by the heaving of the bottom in the open space between the pillars, both in the rooms and on the entries. Creep is best prevented by proportioning the width of the pillars to the size of the openings, with due regard to the thickness of the seam, its depth below the surface and its inclination.

Ques.—In developing a mine, how would you be guided as to the size of pillars along main entries and airways?

Ans.—The width of pillars flanking the main entries and airways will depend largely on the method employed in developing the mine. In the room-and-pillar system the width of these pillars is determined by the depth of cover, nature of the overlying strata, thickness and inclination of the seam, hardness of the coal, roof and floor and the length of time required for the extraction of the coal and final settlement of the roof in the vicinity of the pillars.

As a guide, under ordinary conditions in flat seams, the width of main entry pillars may be taken as one-fourth of the square root of the continued product of the depth of cover, thickness of seam and width of opening, all expressed in feet. Thus, for a depth of 200 ft. below the surface, the main-entry pillars in a 5-ft. seam of commonly hard coal, for rooms 24 ft. wide, may be taken as $\frac{1}{4} \sqrt{200 \times 5 \times 24} =$ say 40 ft. Conditions in respect to the nature and hardness of coal, roof or floor and inclination of seam may increase the width of these pillars.

Ques.—How should aircourses be maintained so as to get the best results from the ventilating power?

Ans.—It is important in this relation to keep the aircourses free of every obstruction that will prevent the free passage of the air current. They should be timbered sufficiently to prevent roof falls or the undue sagging of the roof, and all refuse should be cleaned up at regular intervals. Every effort should be made to keep the aircourses as straight as possible and to avoid sharp bends. Breakthroughs or crosscuts at the head of a pair of entries should have the same sectional area as

that of the airways and be kept free of all obstructions. A most important point in maintaining airways so as to obtain the best result is to build substantial stoppings in all crosscuts that are closed to the passage of air. These stoppings should be sealed so that they are practically air-tight. Also, all doors and air bridges should be made as air-tight as possible to prevent the leakage of air at such points.

Ques.—Explain fully the different systems of ventilation and the benefits to be derived from each.

Ans.—The several systems of ventilation in mines may be described as: (1) Natural ventilation, which is produced by a natural air column formed in a shaft, slope or in dip workings in mines, owing to the difference of temperature between the intake and return aircourses. (2) Furnace ventilation, which is produced by heating the air in an upcast shaft by means of a furnace located in the mine close to the foot of the shaft, thus producing an air column that causes a ventilating pressure in the mine. (3) Fan ventilation, which is divided into two systems known as the exhaust and the blowing systems of ventilation. In the exhaust system the mine is ventilated under a pressure less than that of the atmosphere, while in the blowing system the mine pressure is above that of the atmosphere.

The benefits of natural ventilation consist in making use of natural agencies for producing an air current in the mine and thus avoiding the expense of installing special apparatus for that purpose. The benefits of furnace ventilation are chiefly manifest in deep shafts, where the higher temperature of the furnace shaft produces a high ventilating pressure at a comparatively small cost.

The benefits of fan ventilation are a better control of the ventilation in the mines during all atmospheric changes and the ability to increase or decrease the circulation of air in the mine by changing the speed of the ventilator. The exhaust system of ventilation is particularly applicable to gaseous mines, where it is desirable to perform the haulage on the main-intake aircourse. Such an arrangement makes it necessary to adopt the exhaust system and place the fan at the return opening of the mine. The blowing system of ventilation is particularly adapted to large mines, especially where there is much abandoned area that generates more or less gas that would find its way into the main-intake current if the exhaust system was used and the mine ventilated under a pressure below that of the atmosphere. When the mine pressure is above that of the atmosphere, the gases generated in these abandoned areas are forced back and frequently find vent through crevices and breaks extending to the surface.

Ques.—What is air?

Ans.—Air is the more or less constant mixture of gases surrounding the earth; in other words, the atmosphere that sustains life. It consists chiefly of nitrogen and oxygen gases, in the ratio, by volume, of 4:1, with small amounts of carbon dioxide, moisture, etc.

Coal and Coke News

Harrisburg, Penn.

The vocational bureau of the State Department of Public Instruction is coöperating with the various municipal school boards throughout the state preparatory to the establishment of continuation schools in compliance with the Cox Child Labor Act which becomes effective Jan. 1. This act provides for a compulsory school attendance for a minimum of 8 hr. a week between 8 a.m. and 5 p.m. on any day of the week except Saturday.

Supervisors of state industrial education and field workers are directing a canvass of all mining companies and manufacturers employing minors between the ages of 14 and 16 years. Nearly all the employers interviewed, with the exception of the larger coal companies will retain the minors in their employ after Jan. 1. It will be necessary for some to make slight readjustments in their operations to give every minor 8 hr. a week to attend continuation school. The employer is not compelled to pay the minors for the time they attend school.

The continuation school will be in session the same number of weeks a year as the regular schools of the district. Each pupil attending the continuation school may attend for a period of 8 hr. on one day, 4 hr. on two days, or 2 hr. on four days, per week.

If it is advisable, all the schooling may be given continuously, provided a total number of hours of schooling received by each minor in the continuation school be equivalent to 8 hr. a week for the number of weeks which the regular school is in session. These continuation schools may be conducted in a public school building, or in the establishment in which the minors are employed, or in other suitable buildings.

Insurance Rating Bureau Is Organized

Organization of the Compensation Insurance Rating Bureau of Pennsylvania, the aim of which is to provide uniform classification and rates for liability insurance under the Workmen's Compensation Act, was begun this week with the adoption of a constitution by representatives of 18 of the 32 companies authorized to do casualty business in this state. A board of managers has as yet to be named before organization is completed. Headquarters, it is understood, will be opened in Philadelphia.

Membership in the bureau is open to any company or corporation authorized to issue policies of insurance within the provisions of the Workmen's Compensation Act, and this includes the State Insurance Fund. Under the constitution, the State Commissioner of Insurance is ex-officio a member of all committees of the bureau.

The bureau, it is explained, will bear the same relation to the conduct of employer's indemnity insurance in Pennsylvania as the Underwriters' Association does to the fire-insurance business. One of the first moves to be made by the central board will be to promulgate a manual of rates under the different classifications of risks, based on the merit system. The introduction of uniform rating and inspection system is expected to furnish the insured with an incentive for safeguarding his workmen in every possible way, as under the merit plan the rates are based solely on the hazard involved.

Francis Rawle and J. W. Henderson, counsel for the Italian consulate in Philadelphia, appeared before the Workmen's Compensation Board during the week to discuss the forms to be adopted for establishing proof of death of Italian workers in Pennsylvania, and what proofs will be required by the board to determine the dependents in Italy of workers killed in this country. The representatives of the consulate state that there are about 400,000 Italians in Pennsylvania, many of them working in coal mines.

The Workmen's Compensation Board has received assurance that the United States Steel Corporation will give its complete coöperation in complying with the Workmen's Compensation act in this state. The subsidiary companies in Pennsylvania, include the Carnegie Steel Co., National Tube Co., American Bridge Co., American Steel and Wire Co., American Sheet and Tin Plate Co., Pittsburgh, Bessemer and Lake Erie R.R. Co., and the H. C. Frick Coke Co.

The Steel Corporation in its letter gave the Workmen's Compensation Board the following assurance: "I wish to

assure you, although I think it is quite evident, that it is the disposition of the Steel Corporation and its executive officers without exception, to do all in their power to comply, not only with the letter, but the spirit of this law."

PENNSYLVANIA

Pittston—The Lehigh Valley Coal Co. has commenced pumping the water from the abandoned No. 6 slope at Yorktown preparatory to remining the old workings.

Shannandoah—A number of collieries in this district have recently been idle on account of a lack of empty cars. If it had not been for this factor the workingmen in the coal region would have experienced one of the most prosperous Christmas seasons on record. Even as it is the amount of money paid out in wages by the mining companies to their miners and other employees has been much larger than ordinary.

Dunmore—One man was killed and four more were injured in an explosion of gas at 9:30 o'clock on the night of Dec. 3, in the Underwood colliery of the Pennsylvania Coal Co. Two of the four are probably fatally injured. An Italian miner set off a blast in a gas-filled crosscut just after he had been warned by the fireboss not to shoot. The fireboss, Patrick McKane, is the most seriously injured of the four who were sent to the hospital.

Hazleton—The city assessors have recently increased the valuation of all property from 30 per cent. to 50 per cent. and the Lehigh Valley Coal Co. has appealed to city council that the valuation on 552 acres of coal land owned by the company within the city limits is entirely too high. It is likely that the case will be carried to the courts in case the appeal is not allowed by the city officials.

After having been abandoned about a quarter of a century on account of water accumulating faster than the pumps could remove it, the Yorktown No. 6 slope of the Lehigh Valley Coal Co. is about to be placed in operation. With powerful modern electric pumps no particular difficulty is expected in clearing the mine and thus developing this large deposit of coal.

Lansford—The Lehigh Coal and Navigation Co. is installing a new machine at No. 14 water hoist. It is to be operated by a 1,200-hp. induction motor, taking 25-cycle current at 2,300 volts. It will hoist a load of about 50,000 lb. through a distance of 865 ft. and deliver water at the rate of 180,000 gal. per hour.

Bituminous

Connellsville—The production of coke in the Connellsburg region is practically stationary at about 435,000 tons. An insufficiency of labor prevents an increase in this production.

Leetonia—The coke plant of the Cherry Valley Iron Works of the United Iron and Steel Co., at Leetonia, consisting of 198 ovens, has been placed in full operation after being idle since Jan. 1 last.

Tarris—The Southwest plant, better known as "Old Red Top," of the H. C. Frick Coke Co., has been fired after a shutdown of several months. There are about 124 ovens at "Old Red Top" and when in full operation the plant will employ approximately 120 men and boys. It is also rumored, but the rumor has no confirmation, that the Old Valley Works of the same company will also be revived.

Barnesboro—Fire destroyed the tipple at the Kinport mine of the Hastings Coal and Coke Co. on Dec. 3. The origin of the fire is not known. The fire had a good start before the firemen arrived, but they were able to prevent the destruction of the big supply house and adjoining buildings. As a result of the fire the mines will be closed for some time.

Punxsutawney—The Rochester & Pittsburgh Coal and Iron Co. has posted notices of the closing of the Florence mine for the winter on account of labor troubles. Recently 500 men struck for an increase in wages and the company took the stand that the men had violated the agreement entered into by the miners' union. Not being able to reach an understanding it was decided to suspend work indefinitely.

WEST VIRGINIA

Charleston—A petition in involuntary bankruptcy has been filed in the United States District Court against the Davy Pocahontas Coal Co., of McDowell County. The Graham Manu-

facturing Co. is one of the petitioners. The coal company operates several mines along the N. & W.

Boomer—The work of recovering the bodies of the victims of the recent mine explosion at Boomer has been completed, and the mine will shortly begin operation. It will probably be some little time, however, before the working of this mine settles down to its normal course.

Huntington—Coal shipments over the Chesapeake & Ohio R.R. lines during November showed a decided increase over the month of October, and also the corresponding month of last year. It is stated that 2,417,870 tons of coal were carried during the month, this being an increase of about 100,000 tons over October and 600,000 tons over the same month of 1914. Officials of the railroad are elated over this increase.

Wheeling—The 3-ton cage at the Glendale mine of the Hitchman Coal and Coke Co. recently broke its hitchings and plunged to the bottom of the shaft, a distance of about 100 ft. The cage was loaded with an empty mine car and both cage and car were thoroughly demolished. Four men were near the foot of the shaft when the cage let go, but were at such a distance that none were injured. A new cage has been constructed and work resumed.

KENTUCKY

Whitesburg—Superintendent M. Sergeant and Assistant Superintendent P. F. Pillins, with other officials of the Lexington & Eastern Branch of the Louisville & Nashville, recently made a trip of inspection over the North Fork extension through the Elkhorn coal fields with a view to putting on additional trains to meet the rapidly increasing traffic, owing to the activity of the coal mines around McRoberts, Fleming, Hamond, Seco, Kona and other points.

Frankfort—A record of accomplishment in the way of keeping down forest fires this season is reported from the office of state forester, J. E. Barton. During the season which closed on Dec. 1, there were only 24 fires. The good work is credited to the county fire wardens. All extra employees of the service were discharged on Dec. 1.

OHIO

Columbus—Judge Kinkead, of the county courts, recently granted judgment aggregating \$18,000 against the Sunday Creek Coal Co., and in favor of the New York Coal Co. The judgments were granted in four of a series of suits filed by the New York company against the Sunday Creek company, growing out of coal lands which the former had leased to the latter under royalty agreements.

Bellaire—The Johnson coal mine, at Pipe Creek, recently resumed operations after having been idle since the beginning of the Eastern Ohio coal strike, nearly two years ago. About 100 men were put to work. When operating full force the mine employs nearly 300 men. The present complement will be increased from time to time during the ensuing weeks.

ILLINOIS

Nokomis—Installation of the new Rutledge & Taylor Nokomis mine has been completed. The shaft is on the Big Four and the Chicago & Eastern Illinois railroads.

Duquoin—Trustees of the estate of the late Henry Horn, Sr., mine owner and banker, are disposing of the mining property, real estate and business buildings to satisfy the claims of the depositors in the Henry Horn bank, which failed more than a year ago. The business buildings have been closed out at \$65,000. The mine and coal lands will be sold in a short time. It is expected that more than \$100,000 will be realized and that the creditors will receive about 30c. on the dollar.

Belleville—Operators of the Belleville district have started a movement for the readjustment of the mining scale for the purpose of removing the disadvantage under which the district now suffers by reason of lower mining prices and favorable railroad rates enjoyed by the Franklin, Williamson and Saline County fields, about 100 mi. south of Belleville. The miners are paid 61c. per ton for mining in the Belleville district, while in the southern Illinois field the wage is 75c. The favorable rate was allowed to the southern Illinois field two years ago on account of a disparity of railroad facilities then existing. Since that time the Southern field has obtained better facilities than the Belleville field. In addition, the southern Illinois field now enjoys the same freight rate to St. Louis as the Belleville field. It is claimed that mining properties in St. Clair and Madison counties have been unproductive for two years on account of these disadvantageous conditions.

COAL AGE

IOWA

Des Moines—On Saturday, Nov. 27, 3,000 coal miners in Des Moines and Polk County drew their pay for the last half of November, amounting to \$100,000. Practically every mine worker in the county was in Des Moines. Each man drew from \$35 to \$50. The men are now working on full time.

PERSONALS

Governor Henderson, of Alabama, has just appointed W. H. Thompson, of Piper, as associate mine inspector to succeed T. H. Teinney, resigned.

G. E. Alloway, formerly with the Banks Supply Co., has accepted a position on the sales force of the Ironton Engine Co., and will make headquarters at Ironton, Ohio.

Col. R. A. Phillips, who has for many years been connected with the Lackawanna coal company, has resigned the position of general superintendent on account of failing health.

J. H. Anderson, formerly with the Consolidated Coal Co., and later with the Northern Coal Co., has joined the selling force of the Peabody Coal Co., and will travel in Missouri and part of Illinois.

James Summers, of Hazleton, Penn, electrical and mining engineer, has taken a position with the Ironton Engine Co., Ironton, Ohio, as mining engineer and will be located at the plant at Ironton, Ohio.

Daniel B. Wentz, of the firm of J. S. Wentz & Co., coal operator, has been elected to the directorate of the Franklin National Bank, one of the three most important financial institutions in the city of Philadelphia.

J. J. Wolfersperger, of Pallas, Routt County, Colo., has resigned as superintendent of the Yampa Valley Coal Co.'s mine at that place, effective Dec. 22, after which date he will spend a month in Chicago and Evanston, Ill.

Robert Erskine, of Cinderella, Mingo County, W. Va., was recently appointed District Mining Inspector of the 12th District of that state, succeeding Isaac Murray. Mr. Erskine will have his headquarters at Bramwell, in Mercer County.

A. C. Lamont, of Scranton, chief mining engineer of the Delaware, Lackawanna & Western R.R., was appointed, Dec. 6, general superintendent of the mining operations of the company, succeeding Col. R. A. Phillips, resigned on account of ill health.

Dr. J. A. Udden, geologist of the Bureau of Economic Geology, University of Texas, was appointed Oct. 26, 1915, director of the bureau, the former director, Dr. William B. Phillips, having resigned to become president of the Colorado School of Mines.

Robert B. Beahm, who for many years has handled the general sales of Weston Dodson & Co., Bethlehem, Penn., in an efficient and successful manner, will, at his request, be relieved of that position on Jan. 1, 1916. He, however, will remain with the company in an advisory capacity after that date.

W. J. Smith, formerly superintendent of the Welch Coal and Coke Co., Welch, W. Va., has resigned his position and accepted a place on the sales force of the Ironton Engine Co., Ironton, Ohio, and will look after the Norfolk & Western and Virginian Ry. territory, making headquarters at Welch, W. Va.

Charles R. Wessman, formerly sales manager of the Main Jellico Mountain Coal Co., has accepted a position with the Ironton Engine Co., to handle its mining machinery and will be located in Knoxville, Tenn. He will have charge of the territory around Birmingham, Ala., Tennessee and southeastern Kentucky.

Benjamin Davis, prominent in anthracite mining circles, was severely injured recently. Mr. Davis is the chief electrician of the Susquehanna Coal Co. and while laying out a new line in the Hickory Ridge colliery a pole fell on him, from which he sustained a badly crushed leg, in addition to internal injuries.

L. E. Wood was recently elected president of the Crystal Block Coal and Coke Co., of Rawl, W. Va., the Crystal Block Mining Co., of Gates, the Central Pocahontas Coal Co., of Anawalt, and the Tug River Power Co., of Hazard, Ky., and the Crystal Supply Co., of Rawl. Mr. Wood has for years been in the service of the United States Coal and Coke Co., at Gary, but will henceforth make his headquarters at Welch.

Col. Truman H. Aldrich, one the pioneer coal-mining men of the Birmingham district, who has been postmaster of Birmingham, Ala., for the past four years, and whose term as postmaster expires shortly, will, about Jan. 1, return to his former occupation of consulting mining engineer, which profession he followed for many years before being appointed postmaster. The town of Aldrich, Ala., where the Montevallo Mining Co. is operating a seam of coal, was named for Mr. Aldrich.

W. A. Phillips, representing the coal companies in the upper end of Luzerne County, Penn., was named by the court on Dec. 2, as contractor for the working of the road in Pittston and Jenkins Townships. Mr. Phillips had the contract last year and keeps the highways in repair at the expense of the coal companies without the levy of a road tax. He filed bonds, in the sum of \$11,500, for keeping in repair 23 mi. of highways in Pittston Township, and \$5,000 for taking care of 10 mi. of highways in Jenkins Township.

OBITUARY

John Hastie, aged 69 years, for many years mine foreman at the Katy-did colliery at Avoca, Penn., died recently at his home, 1236 Main St., Avoca.

George P. Cronk, treasurer and general manager of the Pennsy Coal Co., of Franklin, Penn., died recently at his home in Franklin.

William P. Rend, president of the W. P. Rend Coal Co., died recently at Chicago. Mr. Rend was a native of Ireland, coming to the United States at the age of seven years. He was also a veteran of the Civil War. He was heavily interested financially in mines in Ohio and Indiana, the output of which has been estimated at over 1,000,000 tons a year. He also owned 2,000 freight cars used in the coal business.

John N. Hodges, the originator of the steam shovel coal-stripping industry in the Pittsburgh, Kan., district, died at the Stillwell Hotel, Pittsburgh, Nov. 30. He had been in ill health for six months. Mr. Hodges opened the Franklin-Arma-Edson fields. His early life was spent in railroad-construction work and he built many of the branch lines of the Santa Fé railroad in Kansas, Oklahoma and Texas. He is survived by three sisters and two brothers.

Thomas Pruden, 60 years of age, and a prominent coal operator and business man, died recently at Fountain City, a suburb of Knoxville, Tenn. Death was due to acute indigestion. Born in England, Mr. Pruden came to the United States about 35 years ago. He spent his entire life in and about the coal mines and at the time of his death was President and General Manager of the Pruden Coal and Coke Co., the Black Creek Coal and Coke Co. and the First Creek Coal and Coke Co.

Thomas R. Phillips, of Kingston, Penn., treasurer of the Haddock Coal Mining Co., died on Dec. 1 at Nesbitt West Side Hospital, Kingston, of complications, following an operation for gall stones performed on Nov. 23. He was a native of Wales, but had lived in the Wyoming Valley since childhood. He filled various positions with the Plymouth Coal Co. for 40 years, was one of the receivers of that concern, and of recent years had been treasurer of the Haddock company. He is survived by his widow, two daughters and one son.

PUBLICATIONS RECEIVED

"Evaporation of Potash Brines," by W. B. Hicks, Geological Survey Professional Paper 95 E. Illustrated, 7 pp., 9 1/2 x 11 1/2 in.

Electrothermic Smelting of Iron Ores in Sweden, by Alfred Stansfield, Canada Department of Mines, illustrated, 65 pp., 6 1/2 x 9 1/2 in.

"Report of the Chief Inspector of Mines in India for the Year Ending Dec. 31, 1914," by G. F. Adams. Illustrated, 81 pp., 8 1/2 x 13 in.

The Age of the Oeala Limestone. By Charles W. Cooke. Geological Survey, Professional Paper 95 I. Unillustrated, 10 pp., 9 1/2 x 11 1/2 in.

The Caubelego, Budgery and Budgerygar Mines, by E. C. Andrews, New South Wales Department of Mines, illustrated, 121 pp., 6 x 9 1/2 in.

Annual Report of the Secretary of Internal Affairs of Pennsylvania, Part 3, Industrial Statistics 1913-1914, unillustrated, 125 pp., 6x9 in.

"Notes on the Geology of Gravina Island, Alaska." By Philip F. Smith, Geological Survey, Professional Paper 95-H. Illustrated 10 pp., 9 1/2 x 11 1/2 in.

"Erosion Intervals in the Eocene of the Mississippi Embayment," by Edward W. Berry. Geological Survey, Professional Paper 95-F. Illustrated, 9 pp., 9 1/2 x 11 in.

"Preliminary Report on the Diffusion of Solids," by C. E. Van Ostrand and F. E. Dewey. Geological Survey, Professional paper 95 G. Illustrated 13 pp., 9 1/2 x 11 1/2 in.

"Triangulation in West Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri," by A. L. Baldwin, Coast and Geodetic Survey, Serial No. 14, Special Publication No. 30. Illustrated, 67 pp., 9x11 1/2 in.

"Triangulation Along the Columbia River and the Coast of Oregon and Northern California," by Charles A. Mourhess, Coast and Geodetic Survey, Series 15, Special Publication No. 31, illustrated 149 pp., 9x11 1/2 in.

The Geology and Mineral Resources of Buller-Mckinlay Sub-Division, Westport Division, by Percy Gates Morgan and John Arthur Bartram, New Zealand Geological Survey Branch, Bulletin No. 17, illustrated, 209 pp., 8 1/2 x 11 in.

TRADE CATALOGS

The Stow Mfg. Co., Binghamton, N. Y. "The Stow Flexible Grinder." Illustrated, 4 pp., 6x9 in.

The Carnegie Steel Co., Pittsburgh, Penn. "Steel Sheet Piling." Illustrated, 95 pp., 5x7 1/2 in.

The Jeffrey Mfg. Co., Columbus, Ohio. "Revised Price List, Jeffrey Detachable Chain." Illustrated, 7 pp., 6x9 in.

The Quaker City Rubber Co., Philadelphia, Penn. "Mechanical Rubber Goods." Illustrated, 180 pp., 6x9 in.

The Standard Underground Cable Co., Pittsburgh, Penn. "Standard Motor Cables." Illustrated, 12 pp., 6x9 in.

The Gardner Governor Co., Quincy, Ill. "Helpful Hints on Air Compressor Installations." Illustrated, 8 pp., 4x9 in.

The Globe Iron Roofing and Corrugating Co., Cincinnati, Ohio. "Globe Metal Shingles." Illustrated, 10 pp., 4x9 in.

The H. W. Johns-Manville Co., New York, N. Y. "J-X Sanitary Drinking Fountains." Illustrated, 15 pp., 6x9 in.

The Terry Steam Turbine Co., Hartford, Conn. U. S. A. "The Terry Turbine," Bulletin 20. Illustrated, 8 pp., 8 1/2 x 11 in.

The Walsh & Weidner Boiler Co., Chattanooga, Tenn. "Tank, Plate and Structural Steel Work." Illustrated, 12 pp., 8 1/2 x 11 in.

The Harrisburg Pipe and Pipe Bending Co., Harrisburg, Penn. "The Harrisburg Feed Water Heater." Illustrated, 4 pp., 3 1/2 x 6 in.

American Bitumastic Enamel Co., New York City. "Recent Achievements in the Prevention of Corrosion." Illustrated, 47 pp., 8x10 1/2 in.

The Harrison Safety Boiler Works, Philadelphia, Penn. "Finding and Stopping Waste in Modern Boiler Rooms by the Use of Cochrane Meters." Illustrated, 68 pp., 6x9 in.

INDUSTRIAL NEWS

St. Louis, Mo.—The Peabody Coal Co. has removed to larger and more commodious quarters on the 12th floor of the Syndicate Trust Bldg.

St. Louis, Mo.—The "Burr" mine of the Carterville Coal Co., at a recent public sale brought \$37,000. The St. Louis Union Trust Co. was the purchaser.

Philadelphia, Penn.—The Valley Camp Coal Co. has purchased for \$250,000 the steel steamer "E. L. Wallace" and will place the boat in the coal-carrying trade.

Lamar, Mo.—The Arcadia Coal and Mining Co. has been organized at Lamar with a capital stock of \$40,000. The incorporators are Logan Rives, Walter Webb and D. B. Houston.

Nashville, Tenn.—The Blizzard Coal Co. has been organized with a capital of \$20,000. The incorporators are E. F. and Paul Blizzard, Bert Ingram, C. W. Harman, and V. A. Treat.

Hamilton, Ohio.—The Hamilton-Otto Coke Co. is contemplating the construction of a plant for the extraction of light oil as a byproduct of the coke plant, at a cost of about \$8,000.

Birmingham, Ala.—The Majestic Coal Co. filed articles of incorporation in this city recently with a capital stock of \$40,000. The officers are: H. L. Morrow, president; W. H. Kirkland, vice-president; L. W. Andrews, secretary and treasurer.

Washington, D. C.—A petition of the coal operators in the Wyoming region of Pennsylvania for a rehearing on the new rates to the Atlantic coast on small sizes of anthracite was recently denied by the Interstate Commerce Commission.

Lansford, Penn.—The Lehigh Coal and Navigation Co. is now making anthracite briquettes and marketing them. If the venture proves to be commercially profitable it will go a long way toward the prevention of waste in anthracite production.

Knoxville, Tenn.—The last of the property of the Ideal Block Coal Co., bankrupt, near Lily, Ky., has been sold by the receiver, Mr. E. G. Stooksbury, of Knoxville, Tenn. The affairs of the company will probably be wound up by the first of the year.

St. Louis, Mo.—The Dosenbach Realty Co. of this city has just sold a large tract of land, comprising 3,000 acres, in the coal fields of Birmingham, Ala., to the Majestic Coal Co., represented by the Bush interests, who are large coal and iron operators in that district.

Bluefield, W. Va.—The Flat Rock Coal Co., which had offices in this city and whose mines were near Honaker, has been purchased by Lynchburg interests, who intend to take over and operate the mines on a larger scale. S. T. Lee will be president of the new concern.

Whitesburg, Ky.—The Cumberland Mountain Coal Co., with headquarters at Charleston, W. Va., has purchased from the Mason Coal and Coke Co., an eastern corporation, more than 13,000 acres of rich coal and timber land. The property lies along the route of the proposed extension of the Virginian R.R.

Charleston, W. Va.—The new Rex Coal and Coke Co., with headquarters at Huntington, has been organized with a capital of \$100,000. The incorporators are G. F. Wallace, L. R. Reese, J. W. Lawton, C. P. Gibson and F. H. McClung, all of Huntington. Mines will be operated in the vicinity of Ethel, Logan County.

Jefferson City, Mo.—The Iroquois Mining Corporation of Kansas City, has been incorporated with a capital of \$50,000. The incorporators are A. L. Stump, E. M. Gordon and R. L. Dennison. The purpose of incorporation is to operate mines of all kinds, build general mining and ore smelting operations and development business.

Duluth, Minn.—November coal receipts at Duluth and Superior amounted to over 1,000,000 tons and brought up the season's total, exclusive of December shipments, to about 9,700,000 tons, which is approximately 200,000 tons greater than the entire season of 1914. December shipments will still further increase this amount of coal.

Lexington, Ky.—The Kenark Union Land Co., with \$25,000 capital, has filed articles of incorporation here and will engage in development of coal, gas and timber lands, the charter authorizing the company to engage in railroad and real estate business. The incorporators are: R. W. Kenney, Lexington; J. R. Combs and W. G. Sellers, Hazard.

Huntington, W. Va.—Jairus Collins, of Bramwell, W. Va., heading a syndicate of West Virginia capitalists, has leased a boundary of 15,000 acres of Buffalo Creek coal land in the Perry County, Kentucky field, and will begin immediately the development of the property on a large scale, giving employment to several hundred men from the start.

Philadelphia, Penn.—The steel ship "Bylaly," built for the Pocahontas Coal Co., has been launched from the yards of the builders at Camden. The boat has a capacity of 5,450 tons and a speed of 10½ knots. The boat is similar to the "Norfolk," recently built for the Coastwise Navigation Co. The "Bylaly" will ply in the trade between Norfolk and New England points.

Philadelphia, Penn.—The "Silver Shell" and the "Virginia," two new coal steamers just completed for service in the fleet of the Pocahontas Fuel Co. having been delivered by the builders are now on their initial trips in the coal trade. Another vessel similar to the "Virginia" will be launched shortly from the shipyards in Camden, and after being fitted out will join the above fleet.

Charleston, W. Va.—The Hartland Colliery Co. has been organized with headquarters at Clay and a capitalization of \$5,000. The incorporators are John B. Hart and Edward Hart, of Clarksburg; Marcy McD. Price, of New York; David T. Price, of Johnstown, Penn., and W. I. Booth, of Clarksburg. The purpose of the organization is to operate mines in the Henry and Pleasant districts of Clay County.

Wellsburg, W. Va.—It is reported that J. C. McKinley, of the Richland Coal Co., has purchased a considerable acreage of valuable land just north of the Beech Bottom coal tipple. A persistent rumor is to the effect that the property purchased by Mr. McKinley will be used by a large steel corporation in the establishment of a big mill. Mr. McKinley, on the other hand, says that the property will be utilized by the Richland Coal Co.

Toledo, Ohio.—It has been announced here that the Chesapeake & Ohio R.R. has practically financed the proposed link between that road and the Hocking Valley. This connection is to extend from Plymouth, north, to the terminals of the Hocking Valley, and south to Columbus. It has been incorporated under the name of the Chesapeake & Ohio Northern Ry. and has sold \$1,000,000 first-mortgage, 30-year 5 per cent. bonds. The work of constructing the link complete will cost about \$4,500,000.

St. Louis, Mo.—The Rutledge & Taylor Coal Co., with home office in this city, and branches in Chicago, Omaha, St. Paul, Kansas City, Davenport and Fort Dodge, Iowa, is said to be marketing 12,000 tons of coal daily from its three mines: From the Livingston mine, 4,500 tons; Nokomis mine, 4,000 tons, and Security mine, 3,500. Livingston mine is rated as the largest commercial mine in Illinois. Records show that for the year ending June 30, last, 809,291 tons were produced, averaging 4,522 tons per day for each day the mine was in operation.

Knoxville, Tenn.—The property of the New River Coal and Coke Co., comprising about 50,000 acres of coal rights in Anderson, Campbell and Scott counties, Tennessee, on the New River R.R., which was offered for sale a short time ago by Walter Devault, receiver, Knoxville, Tenn., was not sold, and the receiver has had some further prospecting done on the property to better show the coal it contains. The property carries the Red Ash, Dean, Jeillico or State, and Blue Gem seams above drainage, and probably the Coal Creek seam below drainage.

Chicago, Ill.—At a meeting held in Chicago, Nov. 29, of members of the Illinois Coal Operators' Association and the Indiana Bituminous Coal Operators' Association, to discuss the present freight-rate situation, it was decided to intervene against the advance in coal rates in Illinois and Indiana on or before Dec. 25. The general sentiment of the operators was to the effect that they would not oppose any horizontal advance which might include other districts, but they felt that increases from Illinois and Indiana, with a probable reduction in the Hocking field rates, would further reduce Indiana and Illinois tonnages to Chicago and Northwestern markets.

La Follette, Tenn.—The property of the La Follette Coal, Iron and Ry. Co., consisting of coal mines, coke ovens, coal washer, iron ore mines, limestone quarry, blast furnace, machine shop, railroad, and coal, iron and limestone lands, together with dwellings, farms and timber lands, at and near La Follette, Tenn., are to be sold on Dec. 18 by the receiver, Neil Robinson, of La Follette. The furnace is at present closed down, being relined. The plants have all been steadily operated by the receiver for about two years, except that Rex No. 2 coal mine was closed down by the receiver shortly after his appointment, and most of the loose equipment removed to the other two coal mines. A steam shovel for loading coke at the coke ovens has been added to the equipment by the receiver.

Bluefield, W. Va.—Five coal companies, including the Pocahontas Domestic Coal Co., the Williamson Coal and Coke Co., the Warrior Coal and Coke Co., and the Yukon Coal Co., are planning the entire electrification of their mines at a total cost of approximately \$25,000. The Elkhorn Coal and Coke Co. will install an electric plant at a cost of about \$8,000. Another company, one of the largest in the state, operating above Williamson, will install a \$60,000 to \$75,000 electrical equipment in the spring. It is estimated that contracts for upwards of \$150,000 worth of electrical equipment either have been or will be shortly placed in the Norwalk & Western fields. In the Guyan River field the Main Island Creek Coal Co. has advertised for bids on electrical equipment. This concern recently completed the installation of a \$14,800 electrical plant. The company is located at Omar.

Coal Trade Reviews

General Review

Anthracite in short supply, but consumers still generally indifferent. Indications of a runaway market in bituminous. Continued advance in ocean freights. Excellent situation at Pittsburgh and the Middle Western trade is speeding up.

Anthracite—The dealer trade has been fairly busy, as a result of the sustained low temperatures, supplemented by the congestion in transportation facilities, but there is still a general absence of the real snap that should characterize the business at this time. Supplies are clearly falling behind consumption, due to the inadequate car supply and the railroad congestion, but consumers have not yet experienced any inconvenience and fail to show an active interest in the situation. The steam grades are easily the leaders in a generally strong market, and buyers are demanding full shipments on their contracts. Persistent rumors of sweeping revisions in the anthracite circulars appear to be substantiated to a certain extent by the fact that no negotiations have so far been conducted on contracts for the new year.

Bituminous—The slow though persistent improvement of the past several weeks has culminated in a distinct hardening of the market all along the line. Conservative interests are definitely anxious over the situation, and it is generally agreed that any further interruption to transportation facilities, such as a tightening of the congestion at New York, would more than likely precipitate a runaway market. The market is difficult to quote, prices fluctuating over a wide range, some unusually high figures being offered for coal on cars at the distributing centers to fill out contracts, though scarcely any such offers are accepted. Supplies at Hampton Roads are more than ample, but the coastwise movement is exasperatingly slow, due to scarcity of vessels and rough weather, and agencies at Down East points are becoming decidedly worried.

Exports—The unprecedented high freights on steam vessels is forcing more schooners into the off-shore trade, and in spite of this it is practically impossible to negotiate a coal charter to Mediterranean ports, except where an occasional vessel appears that is too old to handle grain. Coastwise freights are moving in sympathy with the export business, and are now ruling at prohibitive levels except where shippers are so hopelessly behind on the contracts that they are forced to meet the new figures. The movement over the Hampton Roads piers continues disappointing, with the demand at a minimum, and the accumulation somewhat above normal.

Ohio Valley—The cessation in Lake shipping has served principally to postpone a marked improvement that would otherwise be noticeable at this time. The situation is rather mixed even as it is, there being an unexpectedly heavy demand for slack coal. Conditions are uniformly favorable to a maximum consumption; the steel industry is working at the highest capacity in its history, manufacturing establishments are running well and the general prosperity will stimulate an active domestic consumption. The removal of the embargo on certain railroads has created a better feeling, but the increased consumption due to the lower temperatures is still throwing an excess load on the carriers. Many of the important steam contracts expiring Jan. 1 are absorbing the attention of the sales agencies.

Middle West—The freezing temperatures have speeded up the Middle Western trade in an impressive manner, while prices have responded to the improved conditions, and the market is thoroughly in control of the operators. Far-sighted consumers are beginning to anticipate a period of high prices and are instituting energetic measures to insure their supply; some large public service corporations are putting out inquiries covering their requirements two and three years ahead. Final receipts at the upper Lake ports have been heavy, while the cold weather has precipitated such a flood of rush orders from consumers that the dock companies have been forced to full-time operations in loading out coal.

A Year Ago—Anthracite under pressure and working schedules heavily curtailed. Bituminous continues flat with prices weak and irregular. Slack the best feature. Reactionary effect of the mild weather.

BUSINESS OPINIONS

Iron Age—Transactions in Lake Superior iron ore are on the verge of closing which it is believed will establish a price of \$4.25 for Mesaba Bessemer and \$3.55 for Mesaba non-Bessemer ore, an advance of 80c. for the former and 70c. for the latter upon the prices of this year. Old-range ores, according to present indications, will sell at an advance of about 75c. over the 1915 schedule instead of \$1, as favored by some producers. As demand is expected for all the ore that can be got down in 1916 it is not improbable that sales later in the season will represent an advance over opening prices. The difficulty of forcing pig-iron production above the present rate appears in the statistics for November. At 3,037,308 tons for last month, the output was 101,244 tons a day, against 3,125,491 in October or 100,822 tons a day.

Boston News Bureau—Attention is focussed on the President's message. This needs study before the best criticism is possible. Wall Street seemed to accept the message fairly well. Probably no message was ever read the world over as this one will be. The more one studies business conditions the more one is impressed with the improvement under way. All through the West sentiment is most optimistic. Then again, the most gratifying reports are those coming from the South. When we recall the situation in the South a year ago, the contrast is most striking. It is generally believed that 1916 will be a most prosperous year for business men in all lines.

Dun—Nearly every development is of a constructive nature, and further gains are added to those previously recorded. Each week domestic consumption enlarges, while the railroad embargoes emphasize the magnitude of the export business. There is now scarcely an industry or trade in any section that is not participating freely in the general advance. In striking contrast to the tendency in the same period of 1914, commercial failures in the United States during November were slightly less numerous than in the previous month, while the aggregate liabilities made the best exhibit of the year. Total insolvencies numbered 1,565 and supplied an indebtedness of \$15,694,434, as against 1,599 in October for \$25,522,380 and 1,815 in 1914, when the amount involved was \$25,489,498.

Bradstreet—Apparently, the week has been the busiest in a long time. Activity in trade as well as in leading industries is unabated—is more marked, in fact, than heretofore. Jobbers, wholesale dealers, retailers, manufacturers and bankers are a unit in reporting activity, and sold-up-for-months-to-come is the condition of numerous industries. Complaints spring from inability to get supplies and from chagrin at not having bought at lower price levels than now prevail, rather than from lack of demand.

Dry Goods Economist—Retailers are evidently beginning to realize the difficulties surrounding the supply of certain lines of merchandise. Buyers who have hitherto shown decided conservatism in providing for even their near-by wants are now urging manufacturers to accept orders for delivery at quite distant dates. The growing indications of prosperity, the high prices of raw materials, the shortage in dyestuffs, and the increased consumption of domestic products through the curtailment of imports are the compelling factors.

Marshall Field & Co.—Current wholesale distribution of dry goods shows a handsome increase over the corresponding period of a year ago. Improved retail demand and low stocks brought merchants to market in large numbers. Road orders for both immediate and future delivery are in considerable advance of previous years. Collections are about normal. Prices are firm.

The Southern Lumberman—Though few December price lists are as yet available, such lists as have been mailed out show further advances in yellow pine prices, and current sales are reported as being made at prices which, on a number of items show material advance over values realized on sales during the first two weeks of November. The volume of business, in hard wood which has steadily increased for the past three months, is now moving with such force as to cause optimism and renewed activity on all sides.

ATLANTIC SEABOARD

BOSTON

Ample coal at Hampton Roads but scarcity of boats to bring it forward. A real "flurry" apparently on the way. Georges Creek and Pennsylvania grades in difficulties over car shortage. Water freights advancing to high figures. Anthracite shippers getting far behind on deliveries.

Bituminous—Receipts of Pocahontas and New River are still light, and bottoms are extremely hard to get. Most of the distributors are anxious over shipments and are doing their best to piece out until cargoes arrive. Rough weather at sea is still the rule, barges moving with exasperating slowness. Meanwhile, there is ample coal standing at Hampton Roads where prices are as yet unaffected by the demand at this end; \$2.85 is still quoted f.o.b., high-water freights putting a quietus on spot purchases in any volume. It is a little soon for premiums on coal f.o.b. on top of say \$1.50 premium on freight alone. Several buyers already covered by contract on their normal supply have been trying to get extra shipments but the scarcity of transportation is so pronounced that such efforts are next to useless.

Undoubtedly on-car prices for delivery inland would be much higher than they are if there were any coal available. As high as \$4.25 has been offered on cars Providence, but no sales reported.

The recent turn in the situation has also given pause to the scramble for 1916-1917 contracts. Most of the options at low figures are now understood to be withdrawn, although something like a million tons was closed while the campaign was on, for delivery from Boston alone. A lot of alongside business has also been closed during the same period.

Shippers of Georges Creek along with other factors served by the same railroads are having difficulties over car supply. Rail movement is bound to be slow for weeks if not months to come, and there will be general surprise if the car situation is not much worse before it is better; \$2 is now quoted for Georges Creek as compared with the usual season basis of \$1.67 f.o.b. mines. Coastwise movement is also very slow and it is only because they have fewer obligations that these shippers have less to worry about than the agencies that look to Hampton Roads.

The Pennsylvania grades are quoted higher than a week ago; \$1.75 is being paid for good coals from the Clearfield region, but comparatively small tonnages are to be had. A good deal of coal is offered "subject to prior sale," and usually that means that ten or dozen brokers may be working on the same lot. Some of the railroads are following the market very closely but no actual transactions can be reported. Meantime operators who sold coal in round figures in order to keep the mines going through the dull season have all they can do to make hand-to-mouth deliveries on their most urgent requisitions.

Water Freights are soaring; \$2 has already been paid, Hampton Roads to Providence, almost no carriers of any kind being available for anything like prompt loading. Practically the only parties who will pay these rates are shippers who are hopelessly behind on their contract obligations, or consumers themselves who have coal due them and insist on chartering for the contractor's account. Freights to Providence are 75@80c, with as high as \$1 reported.

Anthracite—The companies are getting farther and farther in arrears on their orders. Promises are no longer made as to time of delivery. Stove coal is getting in short supply at New York, and dealers here are obliged to take egg and chestnut to get cargoes loaded. Barges move slowly and the demand far exceeds the supply.

Bituminous quotations, f.o.b. loading port at points designated, are about as follows per gross ton:

Philadelphia	New York	Baltimore	F.o.b. Mine
Clearfields	\$2.80@3.05	\$3.10@3.35	\$1.55@1.80
Cambrias and Somersets	3.00@3.25	3.30@3.50	1.75@2.00
Georges Creek	2.92@3.25	3.22@3.55	\$2.85@3.18

Pocahontas and New River prices, on cars Boston, are \$4@4.30; Providence, \$4.15@4.25; and f.o.b. loading ports at Hampton Roads, \$2.85.

NEW YORK

Anthracite consumption increasing. Retailers are busy and urging quicker deliveries. Steam coals scarce and commanding full prices; \$2 coal the rule. Water freights higher.

Anthracite—The hard-coal market is more than holding its own. Consumption has increased considerably and supplies are correspondingly less. While no serious complication has as yet developed, retail dealers state that continued cold

weather will soon necessitate quick deliveries as their supplies are getting low. On the other hand, shippers are seriously handicapped by the severe and continued congestion on the railroads.

Serious car shortages continue and many of the mines are idle much of the time. Egg coal remains the longest in supply and some stray cargoes have been picked up at 10c. below full circular. Stove is in good demand and fewer straight orders for this size are filled; buyers being urged to take a mixed cargo. Chestnut is the strongest. The steam sizes are tight. Pea is bringing full prices all around. Buckwheat No. 1 is well cleaned up; the cheaper grades are bringing \$2.45 while the choice grades are scarce, and held at slight premiums. Rice and barley are also scarce.

Quotations, f.o.b., gross tons, at Tidewater follow:

	Lower Ports		Upper Ports	
	Circular	Individual	Circular	Individual
Broken	\$5.05		\$5.10	
Egg	5.30	\$5.20@5.30	5.35	\$5.35@5.35
Stove	5.30	5.30@5.30	5.35	5.35@5.35
Chestnut	5.55	5.55@5.55	5.60	5.55@5.60
Pea	3.50	3.45@3.50	3.55	3.50@3.55
Buckwheat	2.75	2.45@2.75	2.80	2.45@2.80
Rice	2.25	1.95@2.25	2.30	2.00@2.30
Barley	1.75	1.50@1.75	1.80	1.75@1.80

Bituminous—Heavy demand and high prices are the dominating features of the soft-coal market. The prediction that the market would see \$2 coal at the mines has been realized and even higher figures are noted. Quotations of \$4 f.o.b. Tidewater would not be surprising soon. There is not an over-abundance of coal on hand and railroads are unable to get shipments forward. There are also some labor troubles in the Clearfield region which threaten to spread.

Many shippers are complaining of coal lost somewhere between the mines and Tidewater and are urging the railroads to rush it forward, while boats are held at the docks waiting for the coal. Car supply remains on about a 60 per cent. basis. Very little coal can be had for less than \$2 at the mines and indications point to a 25c. increase within a few days. Line quotations are on a similar basis. No f.o.b. quotations at less than \$3.20 are heard even for the cheaper grades. Slack is held at from \$1.15 to \$1.25.

Quotations, gross tons, f.o.b. Tidewater, for various grades follow:

	Lower Ports		Upper Ports	
	Amboy	Reading	St. George	Mine
Georges Creek Big Vein	\$3.80@3.90	\$3.80@3.90	\$3.80@3.90	\$2.25@2.35
Georges Creek Tyson	3.30@3.50	3.30@3.50	3.30@3.50	1.75@2.00
Clearfield:				
Medium	3.30@3.40	3.30@3.40		1.75@1.85
Ordinary	3.30@3.40	3.30@3.40		1.75@1.85
Broad Top Mountain				1.25@1.45
Cambria County:				
South Forks	3.30@3.55			1.75@2.00
Nanty Glo	3.30@3.55			1.75@2.00
Barnesboro	3.25@3.35			1.75@1.85
Somerset County:				
Quemahoning		3.30@3.50	3.30@3.50	1.75@2.00
Medium	3.25@3.35	3.25@3.35	3.25@3.35	1.75@1.85
Latrobe	3.20@3.30			1.65@1.75
Greensburg	3.30@3.50			1.65@1.85
Westmoreland	3.20@3.30			1.45@1.55
West Virginia Fairmont		3.05@3.15	3.05@3.15	1.25@1.35
Fairmont mine-run		3.0@3.15	3.05@3.15	1.25@1.35
Steam		3.20@3.30	3.20@3.30	1.65@1.75
Western Maryland		3.20@3.30	3.20@3.30	1.65@1.75

PHILADELPHIA

Pea shipments falling behind demand. Consumers doing little stocking. Inadequate car supply and delayed movement serious. Bituminous market nervous. Prices continue upward, with \$2 coal in sight. Exports still quiet.

Anthracite—Another week has passed without the expected snap to the trade developing despite a two-in. snowfall in the suburbs. The dealers were fairly busy, but each day's orders were usually cared for promptly. Late buyers have so far not been inconvenienced and show little interest in the market. This has a depressing effect on the dealer, who is also showing a tendency to avoid preparing for an emergency that is all the time becoming more obvious among the operating interests. If there is any unusual rush it is a question if it can be handled properly. The inadequate car supply has caused many collieries to close down for several days at a time; one of the largest companies had 15 collieries shut down in one day from this cause. Deliveries have also been very unsatisfactory and in many instances coal has been in transit ten days or two weeks between the scales and destination.

Broken coal is still in active demand and the companies are not anxious to take orders for any quantity of this size. A ready market at \$3.50 and tax awaits all the coal that is not contracted for at \$3.25 and tax. Egg coal shows very little improvement and while of course the companies are adhering to their price of \$3.75 and tax, there have been

recent sales by individuals at 25c. per ton less. Stove remains popular and if there is any price cutting it is only on inferior grades and not worth mentioning, for even fair coal brings the full circular of \$4 and tax. Chestnut has had a varied career, but now all good grades are being sold at \$4.15 and tax and one or two shippers with high-grade coal report a shortage.

Pea coal is the real leader and dealers protected at \$2 and tax are calling for heavy shipments. None of the large companies have sold \$2 pea coal in the open market since Nov. 1, but they have sold considerable at \$2.25 and tax. Most of the individuals are insisting on \$2.25 and tax and not so-litigating business at that figure; they are actually moving considerable tonnage at \$2.50.

The companies who usually contract at this time of year, about 90 per cent. of the total, have not as yet taken any steps in that direction. The feeling is becoming general that the delay is due to an impending revision of the prices. Collections continue good, but the retailers apparently do not intend to cease their price cutting. Good shipments continue via Port Richmond for tide points.

Prices per gross ton, f.o.b. mines for line shipment and f.o.b. Port Richmond for tide, are as follows:

	Line	Tide	Line	Tide
Broken.....	\$3.50	\$4.75	Pea.....	\$2.50
Egg.....	3.75	5.00	Buckwheat.....	1.50
Stove.....	4.00	5.00	Rice.....	.85
Chestnut.....	4.15	5.25	Barley.....	.50
				1.50

Bituminous—A nervous tenseness pervades the market. Plenty of business is offering, but there is not near enough coal to supply the demand. The car supply continues to grow less, and the railroads are slow in making deliveries. Prices continue their upward movement, as has been the case for several weeks. The export business is quiet, with a good demand for charters and few boats available, although the week showed a little spurt in the number of charters arranged for. The prices per gross ton are as follows:

Georges Creek Big Vein..	\$1.95@2.10	Fairmont gas, 1.....	\$1.45@1.50
South Fork Miller Vein..	1.73@1.85	Fairmont gas, mine-run..	1.30@1.40
Clearfield (ordinary)....	1.65@1.70	Fairmont gas, slack.....	1.10@1.20
Somerset (ordinary)....	1.65@1.70	Fairmont lump, ordinary..	1.20@1.30
West Va. Freeport.....	1.50@1.60	Fairmont mine-run.....	1.10@1.15
		Fairmont slack.....	1.10@1.20

BALTIMORE

Market dominated by car supply and price list uncertain. Hard-coal surplus here gradually being wiped out. Export movement very poor.

For the most part the operating interests are concentrating their efforts to keep up with their existing contracts rather than covering any new fields. Prices herewith, in gross tons at the mines, are based largely upon coal sold between mines and shippers and mines and mines to take care of urgent contracts:

Mines	Balt.*	Fairmont	Mines	Balt.*
Geo. Crk. Big Vein	\$2.00	\$3.18	Ordinary mine run	\$1.30
Geo. Crk. Tyson...	1.60	2.78	Ordinary 1.....	1.40
Clearfield.....	1.45	2.63	Ordinary slack.....	1.05
South Fork.....	1.60	2.78	Low sulphur mine- run.....	1.50
Latrobe.....	1.45	2.68	run.....	2.93
Somerset (best)....	1.50	2.53	Low sulphur 1.....	1.60
Somerset (good)....	1.35	2.43	Low sulphur	3.03
Quemahoning.....	1.60	2.78	slack.....	1.10
Freeport.....	1.35	2.53	* F. o. b., outside Capes.	2.53
Miller Vein.....	1.50	2.63		

The export movement from this port continues very poor due to the shortage of bottoms. The past week saw a movement of only 11,588 tons on foreign account.

Temperatures around the freezing mark most of the time are causing anthracite consumers to seek coal in larger quantities. The result is that stocks are dwindling; smaller grades are exceptionally scarce in some quarters.

HAMPTON ROADS

November dumpings better than expected. Demand light. Foreign trade irregular. New trade channels opening up.

The movement from Tidewater during the week has not been as heavy as was anticipated. The export movement has been well divided with Italy receiving perhaps the largest amount going to any one country. A number of battleships have been supplied with bunker coal during the week and the government has also taken coal cargoes by colliers.

The demand for both spot and contract business has been light and prices are unchanged on Pocahontas and New River but for high volatile there seems to be some improvement in the demand and some little advance in price. The accumulation of coal at Tidewater is somewhat in excess of normal on the smokeless grades but there is practically no high volatile on hand which has not been contracted for. High rates for steam vessel tonnage is still forcing schooners into the foreign trade, five having taken export cargoes during the week; these cargoes were for two ports in Bermuda, Santo Domingo, Montevideo and San Juan, P. R.

While the total dumpings at Hampton Roads ports for November were not a record as compared with other months of 1915, at the same time they were larger than any November of previous years, and were heavier than expected. The total movement amounted to 1,079,004 tons of which quantity the Norfolk & Western dumped 520,971 tons, the Chesapeake & Ohio 338,364 tons and the Virginian 219,666 tons.

Railroad Tonnages—Dumpings over the local piers for the past five weeks compare as follows:

Railroad	Week Ending				
	Nov. 6	Nov. 13	Nov. 20	Nov. 27	Dec. 4
Norfolk & Western...	120,590	133,329	100,598	118,065	116,450
Chesapeake & Ohio...	78,210	70,282	67,209	93,924	81,873
Virginian.....	46,952	72,888	39,485	54,591	41,386
Totals.....	245,752	276,499	207,292	266,580	239,711

Ocean Charters, Clearances and Freights

OCEAN CHARTERS

The following charters have been reported from various sources during the past week:

PHILADELPHIA

Vessel	To	Tons	Rate	Vessel	To	Tons	Rate
H. Lippitt	Point-a-Pitre	790	\$4.12½	California	River Plate	4,897	11.50
T. Winsmore	Casilda	381	4.00	Apollo	Pernambuco	1,110	8.50*
F. C. Bowen	Calais	892		L. Bossert	Bermuda ³	488	
Skogstad	Martinique	2,357		M. W. Bow	Buenos Aires	1,907	
Tordenskjold	Barbadoes	2,295		R. W. Clark	Bermuda	437	
Kaupanger	Genoa	2,357					
St. Joseph	Italy ¹	900	3.25				
E. H. Blake	Bermuda	900	3.25				
B. P. Pendleton	Para						
Trym	Guantanamo	1,138					
Storford	Havana	2,256					

BALTIMORE

VIRGINIA

Vessel	To	Tons	Rate
California	River Plate	4,897	11.50
Apollo	Pernambuco	1,110	8.50*
L. Bossert	Bermuda ³	488	
M. W. Bow	Buenos Aires	1,907	
R. W. Clark	Bermuda	437	

¹ Or Rio Janeiro. ² January-February. ³ Thence Fernandina to Martinique with fertilizer in bags. ⁴ Back to N. Y. with Quebracho wood.

VESSEL CLEARANCES

The following steamers have cleared from various ports during the week ended Dec. 3:

NORFOLK		NEWPORT NEWS—Continued			
Vessel	Destination	Tons	Vessel	Destination	Tons
Grange ¹	St. Lucia	6,895	Progresso ²	Havana	5,793
Tasmania ³	Leghorn	4,033	Boden ⁴	Stockholm	6,542
Luigi Ciampi	Civita Vecchia	4,163			
Doris ⁵	Gib	5,275			
Stavanger ¹	Kingston	1,030	T. Menier	La Romana	794
Sorakarta ³	Java	5,000	S. Gaspara	Mediterranean	
Allegahnay ⁴	Havana	1,426	J. E. Drake	Martinique	1,400
O. C. Curtis ¹	Montevideo	2,500	Daylight	Fort de France	
Wm. E. Burnham ¹	Hamilton	1,105	Skogstad	Fort de France	2,357
Jacksonville ¹	St. Georges	960	Sonora ²	Cienfuegos	1,186
Geo. M. Grant ⁶	San Juan	1,510	F. C. Bowen	Calais	1,400
C. E. Look ⁶	Santo Domingo	712	Kaupanger	Genoa	2,104
Carlo ⁶	Gib	7,120	Trym	Guantanamo	
			T. Winsmore	Casilda	900

NEWPORT NEWS

Theresa ⁴	Havana	3,032	BALTIMORE
Mayaro ²		994	Franklin
M. Jover ²		2,839	Alexandria

¹ Castner, Curran & Bullitt, Inc. ² Rewind-White Coal Min. Co. ³ Pocahontas Fuel Co. ⁴ Smokeless Fuel Co. ⁵ Flat Top Fuel Co. ⁶ Baker-Whiteley.

OCEAN FREIGHTS

The tonnage scarcity is growing more acute, which has a tendency to advance freight rates to new high levels. Mediterranean rates are unchanged, although occasionally there is a steamer, too old for grain, that is willing to accept coal at less than the equivalent rate on grain. There is an urgent demand for steamers for River Plate ports, and tonnage is difficult to obtain even at advanced figures. Sugar rates from Cuba have advanced to unprecedented figures, and owners of the few boats available for the West Indian trade prefer to send them in ballast unless they can secure very high rates on coal outward. We would quote freight rates on coal by steamer as follows:

To	Rate	To	Rate
Havana.....	\$2.75@3.25	Bermuda.....	\$3.50@ 4.00
Cardenas or Sagua.....	3.50@4.00	Vera Cruz.....	5.50@ 6.50
Cienfuegos.....	3.75@4.00	Tampico.....	5.50@ 6.50
Port au Spain, Trinidad.....	4.75@5.00	Rio.....	12.00
St. Lucia.....	4.75@5.00	Santos ²	12.00@12.84
St. Thomas.....	4.25@4.75	Montevideo.....	12.00@13.20
Barbados.....	4.75@5.00	Buenos Aires or La Plata ¹	12.00@13.20
Kingston.....	4.00@4.25	Rosario.....	13.20@16.20
Curacao.....	4.50	West Coast of Italy.....	21.60
Santiago.....	4.00@4.25	Barcelona ²	19.20@21.60
Guantanamo.....	4.00@4.25	Valparaiso or Callao.....	11.00@13.00
Demerara.....	6.50@7.00	Marseilles.....	20.40@21.60

¹ Consignees paying dockage dues. ² Spanish dues for account. ³ Quotations on Plate coal by British steamers; neutral steamers are more difficult to obtain and the rates are always higher.

W. W. Battie & Co.'s Coal Trade Freight Report.

Note—Figures in bold face type are only approximate.

OHIO VALLEY

PITTSBURGH

Conditions in market unchanged, end of lake season postponing improvement due to better consumption. Slack firmer. Heavier consumption in the steel industry.

The local coal trade has not received any material setback through the termination of the Lake shipping season; rather the influence of the shutting off of this outlet has chiefly served to delay any improvement in conditions that otherwise would have become observable. The feeling in the coal trade is distinctly that there will be heavy demand in the next few months, up to Apr. 1 as many consumers are expected to stock coal, and the regular consumption is certain to be large, probably higher than in any previous winter.

The iron and steel industry continues to run under the highest possible pressure, with no possibility of a decrease for many months, and as capacity has been increased somewhat since the last period of activity the current consumption of coal is above the previous record. Manufacturing establishments generally are running well, and operations are increasing. Domestic demand is fair and with the people generally prosperous, domestic consumption of coal will undoubtedly be heavier by a considerable percentage than last winter.

The Pittsburgh district even up to date has felt scarcely any influence from the war demand; even with the shutting off of Lake shipments local operators do not seem to be in position to name the prices necessary to take export business. Car supplies are unsatisfactory but while there is much complaint there is no very serious inconvenience. As empties come back from the Lakes the situation will doubtless be relieved.

Slack is still firmer. We quote free coal as follows: Slack, 95c. @ \$1; nut, \$1.15; mine-run, \$1.15 @ 1.20; 3/4-in., \$1.25 @ 1.35; 1 1/4-in., \$1.35 @ 1.45; on contract to Apr. 1: Slack, \$1 @ 1.05; nut, \$1.25; mine-run, \$1.25 @ 1.35; 3/4-in., \$1.35 @ 1.40; 1 1/4-in., \$1.45 @ 1.55, per net ton at mine, Pittsburgh district.

BUFFALO

Great activity in slack. All bituminous shippers short of coal. Prices erratic and difficult to quote. Anthracite improving slowly.

Bituminous—The chief feature of the market is the sudden scarcity of Allegheny Valley slack, which is so nearly out of the market that some shippers have withdrawn all quotations. The closing of the Lakes usually throws a surplus of slack on the market and weakens the price but consumers are apparently taking more coal than formerly and are getting anxious over the future supply.

It is reported that the trade in central New York and eastward is taking a large amount of mine-run, while Pittsburgh and Clearfield are staying out of this market on account of their heavy shipments to Tidewater. Even Canada is bidding up on slack and last week paid as high as \$1.35 for Allegheny slack on a \$1.10-rate.

Only approximate quotations are possible as follows:

	Pittsburgh	Allegheny Valley	Penn.
Lump.....	\$2.80	\$2.50	\$2.55
Three-quarter.....	2.65	2.30	
Mine run.....	2.55	2.20	2.30
Slack.....	2.15	2.10	2.30

Quotations are f.o.b. cars at Buffalo or the Niagara bridges and per short ton except east of Rochester or Kingston, Ont.

It is a long time since the bituminous market was in such an unquotable shape. Shippers will not consider contracts and are hardly willing to take single orders except where they have their own mines.

Anthracite—The trade improves steadily, but is not as active as it should be at this time of the year. Chestnut is selling well, but is much less active than usual. Egg is moving slow and it is difficult to get rid of it as fast as it accumulates. Independent anthracite is about normal; full circular prices are obtained, but seldom any premium.

Prices, f.o.b. Buffalo per long ton are \$5.60 for grate, \$5.85 for egg and stove, \$6.10 for chestnut, \$4.30 for pea, \$3.25 for buckwheat, \$2.75 for rice, \$2.50 for barley and \$2.50 for screenings, with 25c. a ton additional for delivering on board Lake vessels.

Lake shipments for the week dropped to 79,076 tons, but the decline was mostly on account of the storms and the scarcity of tonnage, vessels now going out light for grain, if at all. Shipments for November were 443,900 net tons and for the season, 3,757,146 tons, as against 4,292,510 tons to December last season.

TORONTO, CAN.

Revival in industrial enterprises stimulates the coal business. Car shortage expected to improve shortly.

Trade has been active in all lines and with the marked revival of manufacturing activity dealers are looking forward to a busy season. There is some diminution of supplies on hand owing to delayed deliveries due to car shortage, but dealers expect that this difficulty will very shortly be lessened by the closing of navigation diverting railway traffic from the Lake ports to other routes.

Soft coal screenings are still somewhat scarce. Prices are generally well maintained and are as follows, per short ton, for best grades: Retail, anthracite egg, stove and nut, \$7.75; grate, \$7.50; pea, \$6.50. Bituminous, retail, steam, \$5.25; screenings, \$4.25 to \$4.50; domestic lump, \$6; cannel, \$8. Wholesale, f.o.b. cars at destination, three-quarter lump, \$3.79; screenings, \$3.15.

COLUMBUS

Increased demand for domestic sizes. Steam business is still good and the circular well maintained. Large number contracts expire Jan. 1.

Colder weather has stimulated the domestic market. Buying of Hocking grades for immediate shipment was the feature of the week. Retailers' stocks were light and a rush of small business made it necessary for them to replenish their stocks. Because of the car shortage in West Virginia, Ohio operators received a larger share of the business than formerly; production in some West Virginia fields is reported far below normal. Retail prices remain firm.

Small sizes are very strong, and there was some inconvenience due to the shortage of nut, pea and slack and coarse slack. Prices are nearing the \$1 mark. Railroads are still storing fuel but the larger part of the movement is over. Many steam contracts expire at the first of the year. Sales managers are concentrating their attention on renewals. Indications are that prices on this business will be slightly higher than a year ago.

Anthracite is selling well in central Ohio territory. Prices are firm at former levels.

Prices in Ohio fields f.o.b. mines, per short ton, are as follows:

	Hocking	Pomeroy	Eastern Ohio	Kanawha
Re-screened lump.....	\$1.60	\$1.65	\$1.35	\$1.50
Inch and quarter.....	1.50	1.50	\$1.35	\$1.50
Three-quarter-inch.....	1.35	1.40	1.35	
Nut.....	1.25	1.30	1.25	
Mine-run.....	1.15	1.20	1.05	1.10
Nut, pea and slack.....	.85	.90	.80	.75
Coarse slack.....	.75	.80	.70	.65

Mines have been working at about the following percentages of full capacity:

District	Week Ended				District	Week Ended			
	Nov. 13	Nov. 20	Nov. 27	Dec. 4		Nov. 13	Nov. 20	Nov. 27	Dec. 4
Hocking...	50	60	50	60	Cambridge...	70	75	70	75
Jackson...	40	45	40	50	Massillon...	70	75	60	70
Pomeroy...	85	85	80	85	Eastern O...	75	80	75	80
Crooksville	65	65	60	70	Average...	65	60	62	70

TOLEDO

Manufacturers supplies light. Slack coal fluctuating badly. Cars short, but no congestion as yet.

The steam trade is strong and prices are holding very close to the list, for the most part, while slack coal can scarcely be quoted. Last Saturday, quotation on West Virginia slack was around 85c.; Hocking from 85 @ 90c., and Kentucky slack around 90c. with Pittsburgh No. 8 from 85 @ 90c. Pocahontas egg is strong but lump is a trifle weak due to the excessive demand for egg and slack.

The Lake movement is commencing to slow down and is now confined mostly to cleaning up stocks. There is a marked car shortage but as yet there is no congestion at Toledo. Local dealers are fairly well stocked and manufacturing plants have fair supplies.

Prices f.o.b. mine, per short ton are as follows:

	Poca-	West	Hock-	Pom-	Jack-	Pitts.	
	hontas	Virginia	ing	eroy	son	Kentucky	No. 8
Lump.....	\$2.25	\$1.60 @ 1.85	\$1.60	\$1.75	\$2.50	\$2.00	\$1.35
Egg.....	2.25	1.00 @ 1.25			2.50	1.80	1.20
Mine-run.....	1.40	85 @ 1.00	1.10	1.10		90 @ 1.00	1.10
Nut.....	1.75	1.00 @ 1.15	1.25	1.85		1.10 @ 1.25	

CLEVELAND

Closing of the Lake season has thrown a large tonnage of coarse coal on the market. Slack coal in short supply.

The Lake business has practically closed for 1915 with but a few cargoes yet to go. Shippers who had coal left over had to turn it on the local markets, and as Lake coal is almost entirely 3/4-in. screened, it has a comparatively small outlet. The price did not suffer, but sales hardly made an impression and reconsignments from other lake ports materially overstocked the market.

The high prices being paid in the East have prevented any Pennsylvania fine coal coming into this market and quotations on Youghiogheny are nominal as local brokers are not in the market at the prices quoted. Receipts of fine coal were very light over Sunday with prices considerably stronger. The activity in fine coal is due to the fact jobbers and operators have only enough for their contract trade to run the plants three or four days, which is too narrow for a safe working basis.

The retail trade has been good. The weather has not been extremely cold for this time of the year, but it has been necessary to keep up good fires.

Jobbers are paying the following prices f.o.b. Cleveland per short ton:

	Poca-hontas	Youghio-gheny	Bergholz	Wainwright	No. 8
Freight.....	\$1.45	\$1.00	\$0.70	\$0.70	\$0.90
Lump.....	3.35@3.40	.....	2.30	.....	.....
Lump, 6 in.....	.....	2.40	2.10	2.30	2.05
Lump, 1½ in.....	.....	2.30	2.00	2.10	1.90
Lump, 3 in.....	.....	.....	2.40	.....	.....
Egg.....	3.35@3.40	.....	.....	.....	.....
Mine run.....	2.70	2.15	1.90	1.95	1.80
Slack.....	.....	2.00	1.85	1.80	1.80

DETROIT

Steam coal buying continues steady. Inquiry for domestic coal and anthracite improves. Railroad embargo removed.

Bituminous—Buying of steam coal continues with gratifying regularity. Small sizes are the most popular and shippers and jobbers are finding the problem of supply creates perplexities. Domestic coal is moving more freely, and the weather is sufficiently frosty to give strength to the market. Shippers are beginning to participate in the improvement. Car shortage and unusually pressing demands for railroad equipment to move other commodities is slowing down deliveries. The embargo declared by the Grand Trunk railroad, Nov. 16 was removed; Dec 4. Prices on slack and mine-run range between 75 and 90c. a ton. Three-quarter West Virginia lump is \$1@1.10, Jackson Hill domestic lump \$2.50, Hocking domestic lump \$1.50 and smokeless egg and lump holds at \$2.25.

Anthracite—In the anthracite trade, low temperatures have increased business for retailers, but has benefitted shippers only to a minor degree. Car shortage and the restrictions on the Grand Trunk tend to curtail and delay deliveries. Lake shippers are paying a premium of about 15c. a ton over the season rate of 30c. on shipments to Lake Superior ports.

CINCINNATI

Colder weather and continued car shortage has strengthened the market materially. Prices firm and tending toward higher levels.

The coldest weather of the season has steadied up the retail market, in an impressive manner. The inquiries increased materially, and although the actual movevement was not large, the situation has undoubtedly improved. There is still much coal in the hands of retail dealers, but the end of these supplies is in sight. Industrial consumption is also better than at any time this year, as the larger consumers are finding it necessary to use the maximum amount of coal.

Demand is excellent everywhere and the car shortage is the most serious problem at the present time. There is little prospect of immediate improvement in this respect, although the railroads and coal interests are exerting every effort to accelerate the movement.

LOUISVILLE

Demand stiffening due to lower temperatures and improved industrial situation.

The advancing winter is making the demand for domestic coals better and the steam sizes are also stiffening. Mines are operating on a full schedule, while through the eastern section coking plants are resuming. The fact that Pittsburgh is shipping little or no domestic coal into this market has been a good influence on the local business. Eastern Kentucky block coals are bringing, f.o.b. mines, long ton basis, from \$1.65 up to \$2.25, the latter being for fancy coals, while nut and slack ranges from about 50 to 80c. in a few cases.

COKE

CONNELLSVILLE

Coke market colorless, with no change in prices and no definite outlook. Production and shipments practically unchanged.

The coke market continues to drag. There is very little demand for prompt furnace coke and scarcely any inquiry

against contracts for the new year. Shipments on current contracts seem to be adequate for the requirements of the furnaces. The coke trade has no definite theory as to the course of prices in the next few months. The sharp advances in pig-iron prices that are occurring almost daily give the market a favorable aspect from one viewpoint, but another viewpoint is that pig-iron prices are advancing not so much on account of heavily increased demand as because production cannot be further increased, there being scarcely any idle furnaces, and if there are no idle furnaces to blow in there can hardly be an increased consumption of coke, and increased consumption apparently is needed to advance prices.

Present quotations for prompt coke are about on a level with contract prices already made for next year, so that the outlook is not for any material change. A flurry over the holidays is of course always expected. We quote: Prompt furnace, \$2.15@2.25; contract furnace, first half, \$2.35@2.50; year 1916, \$2.25@2.35; prompt and contract foundry, \$2.90@3.25, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Nov. 27 at 432,341 tons, a decrease of 1,061 tons, and shipments at 435,084 tons, an increase of 4,327 tons.

Buffalo—The market is not quite so strong locally, though oven quotations are still on the basis of \$5 for best 72-hr. Connellsville foundry, with no actual stock coke to be had, some 48-hr. being sold instead at \$4.20. Some ovens are quoting as high as \$5.20 for foundry. Consumption increases, but the output sometimes exceeds the demand.

Chicago—In the face of rising prices the demand remains undiminished. Eastern tonnage now being sent into this market is much greater than at any previous time. Spot coke is bringing a premium of at least 50c. per ton. Some long-term contracts are being negotiated. Byproduct domestic sizes are easier. Prices per net ton, f.o.b. cars Chicago, are as follows: Byproduct, foundry, \$5.25@5.75; byproduct, domestic, \$4.75@5; Connellsville, \$5.25@5.75; Wise County, \$5.25@5.50; gas coke, \$4@4.25.

MIDDLE WESTERN

GENERAL REVIEW

Domestic consumption improved. Fine coals in brisk demand. Activity of steam grades noticeable. Smokeless products and anthracite weak.

Activity has characterized all branches of trade during the past week. Freezing temperatures have ruled over the Western country, and the absorption of domestic sizes has gained momentum. Prices are responding to the improved conditions, and sales of Western coals are generally close to the circular. West Virginia smokeless grades and anthracite are about the only weak features of an otherwise strong market. Steam and domestic sizes are in about equal demand.

Belated orders from country dealers are reaching many wholesalers and another week of all-around activity will bring about concerted action on the matter of advancing prices. Certain large consumers foresee an era of higher prices for steam coal, and are taking measures to cover their requirements. Storage by Western railroads has not yet reached the proportions expected, and it is reported that several carriers who have not yet taken any action on this matter are negotiating for large quantities to be put in storage at a convenient season. Some public utility corporations are seeking to make contracts for steam coals over periods of two and three years' time.

CHICAGO

Fair tonnage moving. Smokeless market congested. Indiana and Illinois coals arriving in moderate volume.

Franklin and Williamson County domestic lump shipments have increased to the country dealers; egg and nut are slow but steam lump is steady, and screenings are active. Harrisburg and Saline County domestic lump shipments are rather slow; steam lump orders have not been fully satisfied, while screenings are short and selling at a premium. Some Southern Illinois spot domestic lump and egg has been sold at \$1.50 during this week, but this surplus is now all cleaned up.

Springfield domestic lump shipments are better, due to the fact that two large producers are out of the market at the present time. Considerable coal is moving from this district for railroad storage. Screenings are brisk.

There is considerable activity in Fourth Vein coal of all sizes; Third and Fifth Vein steam lump shipments are steady, with demand for domestic lump increasing. Sullivan County Sixth Vein domestic shipments are larger, but egg

and nut from this district are still torpid. Greene County lump is quiet. All Indiana free screenings are absorbed at maximum prices.

The West Virginia smokeless market is somewhat demoralized owing to the arrival of a considerable tonnage of lump and egg intended for shipment by the Lakes. Mine-run has been sympathetically affected by this situation. Considerable lump and egg has sold as low as \$1.40, and mine-run dropped to \$1.15 in some cases. Pennsylvania mine-run shipments are limited, while slight recessions are noted in the demand for lump and egg, nut being active.

The market for Hocking coal, which has been soft for several weeks, is much improved. Lump in limited quantities is sold at the full circular price of \$1.60.

Over 100 cars of anthracite accruing demurrage were sold this week at some concession in price in order to get the coal off the market.

Quotations in the Chicago market are as follows, per net ton f.o.b. mines:

	Williamson and Franklin Co.	Springfield	Sullivan	Clinton	Knox and Greene Cos.
Lump.....	\$1.60@1.75	\$1.60@1.75	\$1.60@1.75	\$1.60@1.75	\$1.40@1.60
Steam lump.....	1.25@1.35	1.25@1.35	1.20@1.35	1.25@1.35	1.25@1.35
2½ and 3-in. lump.....	1.35@1.50	1.50@1.60	1.30@1.45	1.25@1.35	1.25@1.35
14-in. lump.....	1.25@1.35	1.25@1.35	1.15@1.25	1.25@1.35	1.25@1.35
Egg.....	1.60@1.75	1.50@1.65	1.20@1.30	1.25@1.35	1.25@1.35
Nut.....	1.60@1.75	1.60@1.65	1.05@1.20	1.20@1.35	1.10@1.25
No.1 washed.....	1.60@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75
No.2 washed.....	1.40@1.50	1.40@1.65	1.40@1.65	1.40@1.65	1.40@1.65
No. 1 nut.....	1.60@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75
No. 2 nut.....	1.40@1.50	1.40@1.50	1.40@1.50	1.40@1.50	1.40@1.50
Mine-run.....	1.10@1.15	1.05@1.10	1.00@1.10	1.10@1.20	.95@1.10
Screenings.....	.75@.80	.65@.75	.70@.75	.70@.80	.75@.85
Harrisburg & Salina Co. E. Kentucky	Poach. & Penna.	W. Va. Smok'l. Smokeless	Hocking		
Lump.....	\$1.60@1.75	\$1.50@2.40	\$1.85@2.25	\$1.90@2.25	\$1.50@1.85
14-in. lump.....	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
Egg.....	1.60@1.75	1.40@2.00	2.00@2.25	1.90@2.25	1.00@1.25
Nut.....	1.25@1.65	1.65@1.75	1.40@1.60	1.40@1.60	1.40@1.60
No. 1 nut.....	1.60@1.75	1.50@1.75	1.50@1.75	1.50@1.75	1.50@1.75
No. 2 nut.....	1.40@1.50	1.40@1.50	1.40@1.50	1.40@1.50	1.40@1.50
Mine-run.....	1.15	.90@1.15	1.25@1.40	1.25@1.40	1.15@1.25
Screenings.....	.70@.75	.75	1.00	1.00	.60@.70

Kanawha splint lump, \$1.50@1.90.

ST. LOUIS

Demand improving. Screenings in short supply. Domestic trade waiting colder weather.

There is a gradual improvement in the industrial demand. There are not enough screenings to supply the requirements and the price was forced up at the end of the week to 55@60c. for Standard and Staunton and 65@70c. for Franklin and Williamson County. There has not been sufficient change in the weather to quicken the domestic demand.

Quotations f.o.b. mines during the past week have ranged on the following basis per short ton:

	Frnk. Co.	Wlmsn. Co.	Staunton	Standard
6-in. lump.....	\$1.50@1.65	\$1.50@1.65	\$1.25	\$1.00@1.15
8-in. lump.....				.90@1.15
2-in. lump.....			1.15	1.00
3x6 egg.....	1.40@1.65	1.40@1.65	1.00	.85
2x6 egg.....				.85
No. 1 nut.....	1.50@1.75	1.50@1.75	1.50@1.75	.75@1.00
No. 2 nut.....	1.25@1.50	1.25@1.50	1.25@1.50	.70@.85
No. 1 washed.....	1.40@1.50	1.40@1.50	1.40@1.50	1.40@1.50
No. 2 washed.....	1.25@1.40	1.25@1.40	1.25@1.40	1.25@1.40
No. 3 washed.....	1.15@1.25	1.15@1.25	1.15@1.25	1.15@1.25
No. 4 washed.....	1.15@1.25	1.15@1.25	1.15@1.25	1.15@1.25
No. 5 washed.....	.75@.85	.75@.85	.75@.85	.75@.85
Screenings.....	.65@.70	.65@.70	.55@.60	.55@.60

Freight Rates—Inner group, St. Louis, 57½c.; East St. Louis, 37½c.; outer group, St. Louis, 72½c.; East St. Louis, 52½c.

DULUTH

Cold weather stimulates buying. Good movement of all grades. Prices firm.

There was a steady demand for all the grades of bituminous coal during the past week. The weather was moderately cold and the retailers and householders bought heavily. A large number of orders were received by the various dock companies, which have been working full time to satisfy the demands of the trade. Receipts have been quite heavy recently, the companies putting forth every effort to get as much coal forward as possible before the close of navigation, which is likely to occur at any time. Prices remain firm. Quotations per short ton f.o.b. cars at the Duluth docks are as follows:

	Yough	Splint	Hock	Smokeless	Elkhorn
Lump.....	\$3.40	\$3.40	\$3.40	\$4.75	\$3.75
Dock run.....	3.10	3.10	3.10	3.25	3.25
Egg, stove and nut	3.40	3.40	3.40	4.75	3.65
Screenings.....	2.40	2.40	2.25	2.75	2.55

Anthracite business during the past week has been very good, the cold weather being responsible for a large number of "hurryup" orders. Prices are as follows: Nut, \$7.10, stove and egg, \$6.85, pea, \$5.55 and buckwheat, \$4, all per short ton f.o.b. cars at Duluth docks.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK AND WESTERN

Destination of shipments over this road for October and the ten months of this year and the last year were as follows, in short tons:

	October		Ten Months	
	1914	1915	1914	1915
Coal				
Tidewater, foreign.....	98,839	361,883	1,686,391	3,426,479
Tidewater, coastwise.....	302,297	234,623	3,220,081	2,673,915
Domestic.....	1,596,703	2,467,395	17,071,474	18,597,536
Coke				
Tidewater, foreign.....	63,625	4,511	339	27,591
Domestic.....		85,618	870,729	730,816
Total.....	2,061,464	3,154,030	22,849,014	25,456,337

MIDDLE WESTERN ROADS

The following is a comparative statement of coal handled over the 17 principal Middle Western carriers for September, and the first nine months of this year compared with the same periods last year:

	September		9 Months	
	1914	1915	1914	1915
Illinois Central.....	790,221	785,514	5,564,866	5,419,904
C. & E. I. R.R.....	622,905	656,194	4,956,424	4,406,854
C. B. & Q. R.R.....	613,729	645,614	4,077,357	3,955,925
C. C. & St. L. R.R.....	484,695	488,694	3,532,238	3,639,923
Vandalia Line.....	444,340	430,638	3,228,842	3,502,753
C. T. H. & S. E. Ry.....	282,944	258,567	2,228,919	2,192,756
C. & A. Ry.....	153,430	189,029	1,276,759	1,391,545
Wabash R.R.....	166,550	146,595	1,104,377	1,135,716
St. L. I. M. & S. Ry.....	167,024	169,047	1,145,792	1,145,776
Southern Ry.....	94,965	127,633	1,114,007	832,923
B. & O. S. W. R.R.....	99,767	93,110	565,175	716,641
St. L. T. & E. R.R.....	67,631	52,908	495,879	433,571
St. L. & O. F. Ry.....	52,227	54,560	386,595	455,102
L. & M. Ry.....	63,332	42,835	359,630	342,275
C. I. & L. Ry.....	43,268	61,866	425,873	487,944
C. P. & St. L. Ry.....	36,343	44,761	257,587	304,835
C. & N. W. Ry.....	36,721	33,407	240,231	296,311
Totals.....	4,220,092	4,280,972	30,960,651	30,660,754

I. C. C. No. 6080—Elmore—Benjamin Coal Co., Et Al. vs. Chesapeake & Ohio Ry. Co., Et Al.

Through rates on coal in carloads from the Kanawha and New River, W. Va., fields on lines of the Chesapeake & Ohio Railway Company to Milwaukee, Wis., not found to be unreasonable. Request for joint rates denied. Complaint dismissed.

CHICAGO LAKE RECEIPTS

Coal receipts at the port of Chicago and South Chicago, classifield according to shipping points, for the month ending Nov. 30, 1915, midnight, were as follows:

From	1915		1914	
	Hard	Soft	Hard	Soft
Buffalo.....	64,918		97,798	
Oswego.....	11,364		22,703	
Ashtabula.....		58,547	7,200	6,980
Sandusky.....		42,734		
Cleveland.....		39,693		19,832
Toledo.....		34,726		6,000
Fairport.....		10,015		
Erie.....	14,000			
November total.....	90,282	185,717	127,701	32,812
Season total.....	777,179	897,389	782,214	604,722

FOREIGN MARKETS

GREAT BRITAIN

Nov. 26—Tonnage arrivals are more ample and there is a prospect of a more active market. Quotations are approximately as follows:

Best Welsh steam.....	Nominal	Best Monmouthshires....	\$4.44
Best seconds.....	Nominal	Seconds.....	4.32
Seconds.....	\$4.44	Best Cardiff smalls.....	2.82
Best dry coals.....	5.64	Cargo smalls.....	1.92

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—Rates continue to rise and are approximately as follows:

Gibraltar.....	\$5.79	Naples.....	\$11.00	St. Vincent.....	\$7.80
Marseilles.....	11.82	Alexandria.....	13.20	River Plate.....	9.60
Algiers.....	11.00	Port Said.....	13.20		
Genoa.....	12.48	Las Palmas.....	7.20		

Coal Contracts Pending

The purpose of this department is to diffuse accurate information of prospective purchases and prices with a view to affording equal opportunity to all, promoting market stability and inculcating sound business principles in the coal trade.

*Indicates contracts regarding which official information has been received.

Supplemental Notes

Under this heading additional or supplemental information regarding old contracts appears, together with the page number of the original notice.

424—St. Louis, Mo.—This contract (Vol. 7, p. 568), which provides for the requirements of the Continental Portland Cement Co., will be negotiated about the twenty-fifth of each month. Approximately 4,000 tons of Carterville 1½-in. screenings per month are required for charging the kilns. The power plant of the company has been electrified. Address Pur. Agt., J. P. Terpenny, The Continental Portland Cement Co., Syndicate Trust Bldg., St. Louis, Mo.

1455—New Orleans, La.—This contract (p. 530), which provides for furnishing the Hotel De Soto with its annual fuel requirements, involving approximately 130 tons per month, will be awarded about the first of the year. Address Gen. Mgr. Vic Le Beau, Hotel De Soto, Baronne and Poydras St., New Orleans, La.

1581—New Orleans, La.—This contract (p. 700), which provides for furnishing the Leland Steamship Co. with approximately 50,000 tons of steam coal, will not be negotiated until toward the close of January. Address Purchasing Agent Leland Steamship Co., 1210 Hibernia Bank Bldg., New Orleans, La.

1643—Birmingham, Ala.—The customary price at which this contract (p. 870), which provides for furnishing the Birmingham Railway, Light and Power Co. with approximately 20,000 tons of coal is negotiated, is about \$1.50 per ton. The business is let on competitive bids. Address Pur. Agt., Chas P. Doerr, Birmingham Railway, Light and Power Co., Birmingham, Ala.

1667—Ironton, Ohio—No bids were received on this contract (p. 912), which provides for furnishing the coal for the local pumping station, and readvertisements will be made, the date of opening the new bids to be Dec. 16. Address Clk. F. A. Ross, Bd. of Pub. Service, Ironton, Ohio.

1679—New York, N. Y.—Bids have been received on this contract (p. 912), which provides for furnishing anthracite and bituminous coal to the various public buildings, courts, etc., in the Borough of Manhattan, as follows:

	Buckwheat			Mine-Run
	No. 1	No. 2	No. 3	
Gavin Rowe (a).....	\$1.72½	\$1.50	\$1.31	\$2.79
Wm. Farrell & Son (b)	4.99	4.49	3.99	5.99

(a) These bids are on 1,000 lb. units. (b) These bids are on 2,000 lb. units. Address Pres. Marcus M. Marks, Room 2,032, 20th Floor, Municipal Bldg., New York, N. Y. (No. 19, Vol. 6, p. 892).

New Business

Volume and page number in parentheses at the end of an item indicate where the previous announcement, bids and awards on that contract may be found.

1712—Pottstown, Penn.—The Wilbrahame Green Blower Co. usually send out inquiries on their annual fuel contract on Dec. 1, and close the business on Jan. 1. They consume about 600 tons per annum, and deliveries are by Philadelphia & Reading Ry. Address Pur. Agt. James, Wilbrahame Green Blower Co., Pottstown, Penn.

1713—Pottstown, Penn.—The McClintic-Marshall Construction Co. usually contract for their annual fuel requirements, involving approximately 1,200 tons, on Jan. 1. Address Pur. Agt. Corbett, the McClintic-Marshall Construction Co., Pottstown, Penn.

1714—Detroit, Mich.—The Board of Public Works will receive bids until 10 a.m., Dec. 31, for furnishing coal as follows: Steam coal, 2,000 tons of either mine-run or three-quarter lump for use at the Asphalt Plant to be delivered f.o.b. cars in the Western district yards; 50 tons of same to be

delivered in wagon lots on the Belle Isle Bridge; 1,800 tons of three-quarter lump delivered in wagon lots at Fairview Pumping Station; 30 tons Jackson Hill three-quarter lump, to be delivered in wagon lots at the yard or barn, as directed. Anthracite—25 tons each of chestnut, stove and chestnut mixed in equal proportions, stove and egg coal, to be delivered at the yard or barn, as directed. Pocahontas lump—approximately 100 tons, to be delivered f.o.b. cars Eastern or Western district yards. Bidders are required to file a certified check for \$1,000 with bids. Address Comr. Geo. S. Finkle, Dept. of Pub. Wks., Detroit, Mich. (Vol. 7, p. 189, 231.)

1715—Austin, Tex.—The Water and Light Dept. at this place usually contract for its annual fuel requirements, involving approximately 60 tons of lignite coal per day, about Jan. 1. The business is done on competitive bids, and the customary price is about \$1.48 per ton. Address Supt. E. C. Bartholomew, Water and Light Plant, Austin, Texas.

1716—Reading, Penn.—The Reading Hardware Co. usually contract for their annual fuel requirements, involving approximately 5,000 tons, on Jan. 1. Address Pur. Agt. Isaac Treat, Reading Hardware Co., Reading, Penn.

1717—Reading, Penn.—The Penn Hardware Co. at this place usually contracts for its annual fuel requirements, involving approximately 3,000 tons, on Dec. 1. Address Purchasing Agent, Penn Hardware Co., Reading, Penn.

1718—Robesonia, Penn.—The Robesonia Iron Co. usually contract for their annual fuel requirements, involving approximately 35,000 tons, on Jan. 1. They also require some low phosphorus 42-hr. coke. Deliveries are made by Philadelphia & Reading Ry. Address Supt. S. B. Pattison, Robesonia Iron Co., Robesonia, Penn.

1719—Riverside, Penn.—Wm. F. Taubell, Inc., usually contract for their annual fuel requirements, involving approximately 8,000 tons, on Jan. 1. Address Pur. Agt. Wells, W. F. Taubell, Inc., Riverside, Penn.

1720—Salem, N. J.—The Gayner Glass Works usually contract for their annual fuel requirements, involving approximately 4,000 tons on Jan. 1. The company ordinarily uses South Fork coal. Address Pur. Agt. Gayner, the Gayner Glass Works, Salem, N. J.

1721—Salt Lake City, Utah—Bids were received until 3 p.m., Dec. 8, for furnishing the Utah State Prison with approximately 100 tons of lump, and 600 tons of screened slack coal during the ensuing year. Deliveries are to be f.o.b. track at the State Prison. All bidders must submit a certified check for 5 per cent. of the amount of their bids. Address Warden Arthur Pratt, Utah State Prison, Salt Lake City, Utah.

1722—Quenelda, Ala.—The Quenelda Graphite Co. usually contracts for its annual fuel requirements, involving approximately 1,560 tons of bituminous coal, about Jan. 1. Deliveries are made by railroad at the rate of about 130 tons per month, and the company has storage capacity for 150 tons. Address Pur. Agt. J. Warren May, Quenelda Graphite Co., Quenelda, Ala.

1723—Russellville, Ky.—The Light and Power Dept. at this place usually contracts for its annual fuel requirements, involving approximately 2,880 tons of bituminous mine-run, about Jan. 1. The business is done on competitive bids, and the customary price is about 87½c. per ton. Address Clk. C. W. Andrews, The Light and Power Co., Russellville, Ky.

1724—Minneapolis, Minn.—The Electric Short Line Ry. Co. at this place usually contracts for its annual fuel requirements, involving approximately 2,200 tons of Youghiogheny dock-run, about Jan. 1. Deliveries are made by railroads at the rate of six cars per month, and the company has storage capacity for 150 tons. Address Gen. Mgr. D. K. Hunter, Electric Short Line Ry., 809 Phoenix Bldg., Minneapolis, Minn.

1725—Chambersburg, Penn.—The Wolf Co. at this place usually contracts for its annual fuel requirements, involving approximately 2,250 tons of bituminous mine-run coal, about Jan. 1. Deliveries are made by railroad at the rate of one car per week, and the company has storage capacity for 300 tons. Address Pur. Agt. Frank Duncan, The Wolf Co., Wolf St., Chambersburg, Penn.

1726—Elkhart, Ind.—The Elkhart Bristol Board and Paper Co. are in the market for approximately 3,500 tons of West Virginia mine-coal coal, deliveries to start Feb. 1 and to be made in regular weekly proportions. Address Pres. C. E. Frye, The Elkhart Bristol Board and Paper Co., Elkhart, Ind.

+1727—Denver, Colo.—The City Government will receive bids until 10 a.m., Dec. 13, for furnishing coal, to be delivered in carload lots, at the municipal coal yard, corner of 19th and Kalamath St., of the following grades: Northern Colorado lignite; Canon City or Walsenburg bituminous; anthracite; Routt County. Bids will also be received for furnishing and delivering coal from the same fields to the various city departments. On the business providing for carload deliveries, shipments must be made within 24 hr. of the receipt of the order, and on the business to be delivered to the various city departments, such delivery must be made within 24 hr. The successful bidder on either of these specifications will be required to furnish a bond for \$5,000. Address Comr. Clair J. Pitcher, Room 209, City Hall, Denver, Colo.

+1728—Cambridge, Mass.—The Cambridge Water Board received bids until 11 a.m., Dec. 7, for furnishing the local pumping station with approximately 1,000 long tons of coal during the next six months. Deliveries, if by rail (Boston & Maine R.R.), are to be made immediately, and if by team are to be made at the rate of ten tons per day, beginning Dec. 14. The successful bidder will be required to furnish a bond for 25 per cent. of the amount of the contract. Address Gen. Supt. Edward W. Quinn, Cambridge Water Works, Cambridge, Mass.

1729—Kansas City, Mo.—The Abernathy Furniture Co. at this place will contract about Jan. 1 for its annual fuel requirements for both the Kansas City and Leavenworth branches. The company uses about one carload per week of Cherokee slack at the Kansas plant and about half as much at the Leavenworth. Address Purchasing Agent, Abernathy Furniture Co., Kansas City, Mo.

1730—Uhrichsville, Ohio—The Evans Clay Manufacturing Co. at this place are in the market for a tonnage of West Virginia, Pennsylvania or Kentucky bituminous lump coal. Address Purchasing Agent, The Evans Clay Manufacturing Co., Uhrichsville, Ohio.

+1731—New Orleans, La.—The City Government will soon request bids for its annual fuel supply, involving approximately 15,000 short tons of coal, for the various city buildings and departments. The present contract is held by the Tennessee Coal, Iron and R.R. Co. and expires on Jan. 28, the business having been taken at \$3 per short ton for Pratt mine-run and \$3.25 for Cahaba egg coal. The successful bidder will be required to furnish a bond for \$500. Address Commissioner of Police and Public Buildings, Room 27, City Hall Building, New Orleans, La.

1732—Lima, Ohio—The Solar Refining Co. at this place will be in the market early in January for its annual fuel requirements, involving approximately 45,000 tons of mine-run, and 30,000 tons of nut and slack coal. Address Pres. J. G. Neubauer, The Solar Refining Co., Lima, Ohio.

1733—Union City, Mich.—The Peerless Portland Cement Co. at this place usually contracts for its annual fuel requirements, involving approximately 10,000 tons of three-quarter lump and 35,000 tons of coarse slack coal, about Jan. 1. Deliveries are made by rail at the rate of about 40 tons of lump, and 110 tons of slack per day. The company has storage capacity for 1,800 tons. Address Mgr. W. M. Hatch, Peerless Portland Cement Co., Union City, Mich.

1734—De Queen, Ark.—The De Queen Ice and Light Co. at this place usually contracts for its annual fuel requirements, involving approximately 2,000 tons of slack and crushed mine-run coal, about Jan. 1. The business is done on competitive bids, and usually goes at \$2.50 per ton for the slack and \$3 for the mine-run. Address Purchasing Agent, The De Queen Ice and Light Co., De Queen, Ark.

1735—Tarentum, Penn.—The Borough Light Plant at this place usually negotiates its annual fuel contract, involving approximately 3,000 tons of mine-run coal, about Jan. 1. The business is usually let at about \$1.50 per ton, and is done on competitive bids. Address Supt. J. C. Turner, Borough Light Plant, Tarentum, Penn.

1736—South Whitley, Ind.—The Light and Water Plant at this place usually contracts for its annual fuel requirements, involving from 1,500 to 1,800 tons, about Jan. 1. Bids are requested on different grades of steam coal, and a guarantee of the heat value must accompany each bid. Address Treas. F. E. Fox, Light and Water Plant, South Whitley, Ind.

1737—Philadelphia, Penn.—The Pennsylvania Salt Manufacturing Co. is in the market for its annual supply of an-

thracite rice coal, amounting to about 45,000 tons. Address Purchasing Agent, The Pennsylvania Salt Manufacturing Co., Widener Bdg., Philadelphia, Penn.

1738—Atlantic City, N. J.—The Atlantic City Gas Co. is in the market for its annual fuel requirements, involving approximately 10,000 tons of broken coal, delivery to begin Jan. 1. Address Superintendent, The Atlantic City Gas Co., Atlantic City, N. J.

1739—Philadelphia, Penn.—The W. J. McCahan Sugar Refining Co. is in the market for its annual fuel requirements, involving approximately 15,000 tons of anthracite buckwheat, delivery to begin Jan. 1. Address Purchasing Agent, The W. J. McCahan Sugar Refining Co., Tasker St., Delaware River, Philadelphia, Penn.

1740—Madison, Ill.—The coal contract of the International Cooperage Co., involving approximately 5 or 6 cars of Standard 2-in. lump coal per month, will expire on Dec. 31. The company has not yet decided upon how long it will contract for. Deliveries are made via the Terminal. Address Pres. Martin Snider, 911 Sweetland Bldg., Cleveland, Ohio.

1741—Philadelphia, Penn.—N. Snellenburg & Co. is in the market for its annual fuel requirements, involving approximately 10,000 tons of anthracite buckwheat coal. Deliveries are to be made at the company's warehouse at 10th and Berks St., during the year beginning Jan. 1. Address Purchasing Agent, N. Snellenburg & Co., 12th and Market St., Philadelphia, Penn.

1742—Milford, N. J.—The Crown Wall Paper Manufacturing Co., Inc., is in the market for its annual fuel requirements during the ensuing year, amounting to between 800 and 1,000 tons of bituminous coal. Address Purchasing Agent, Crown Wall Paper Manufacturing Co., Inc., Milford, N. J.

1743—Philadelphia, Penn.—The Baldwin Locomotive Works is in the market for about 7,000 tons of anthracite broken coal, delivery to be made during the year beginning Jan. 1. Address Purchasing Agent, The Baldwin Locomotive Works, Philadelphia, Penn.

1744—St. Louis, Mo.—The Wilson Stove Manufacturing Co. at this place is in the market for its annual fuel requirements, involving approximately 80 tons per month of 2-in. screened lump coal. Address Pur. Agt. S. H. Long, The Wilson Stove Manufacturing Co., St. Louis, Mo.

1745—Martins Ferry, Ohio—Bids will be received until noon, Dec. 13, for furnishing the Municipal Electric Light and Power Plant with its coal requirements during the ensuing year. From 3,000 to 4,000 tons of bituminous mine-run are required, and the usual price is around \$1.45 to \$1.50 per ton. Specifications may be had on application. Address Dir. E. Brown, Pub. Ser., Martins Ferry, Ohio. (No. 215, Vol. 7, p. 446.)

+1746—New York, N. Y.—The Department of Docks and Ferries will receive bids until noon, Dec. 20, for furnishing coal as follows: A mixture of 30% bituminous and 70% buckwheat, 15,000 tons to be delivered at St. George and 5,000 tons at 39th St., Brooklyn; for the Dock Department, 2,000 tons of No. 3 buckwheat. Address Comr. of Docks R. A. C. Smith, Pier "A," New York. (No. 1583, Vol. 8, pp. 700, 828.)

Contracts Awarded

Note—Successful bidders are noted in **bold face** type.

+1215—Springfield, Ohio—This contract (p. 245), which provides for furnishing the City Government with coal for the Water Works during the ensuing year, has been awarded to the **Chas. E. Grube Coal Co.**, at \$2.38 per ton. Address City Mgr. Ashburner, Springfield, Ohio.

1457—Sharpsburg, Penn.—This contract (p. 530) which provides for furnishing the St. Mary's Church and various buildings of the Parish, has been awarded to **Walter Bros.**, at \$1.70 per ton for mine-run coal. Address Rev. John Otten, 210 Penn St., Sharpsburg, Penn.

+1605—Frankfort, Ky.—This contract (p. 737), which provides for furnishing the Capitol Heating Plant, and other state buildings with coal during the ensuing year, has been awarded to the **R. A. Brawner Coal Co.** Address Custodian Samuel M. Lykins, Capitol Bldg., Frankfort, Ky.

1634—Granite City, Ill.—This contract (p. 870), which provides for furnishing the American Steel Foundry Co. with its annual fuel requirements, has been awarded as follows: **Mt. Olive & Staunton Coal Co.**, 2,500 tons of 1½-in. screenings per month; **Donk Bros. Coal and Coke Co.**, 600 tons of Nos. 3 and 4 washed coal per month; **Consolidated Coal Co.**, 150 tons of lump coal per month. No prices have been announced, but it is understood that screenings contract was closed at 60c. per ton. Address Pur. Agt. T. E. Moritz, American Steel Foundry Co., Chicago, Ill.

1649—Denver, Colo.—This contract (p. 871), which provides for furnishing the Mine and Smelter Supply Co. with a 30- or 40-ton car of Piedmont coal, has been awarded to the **Pennsylvania Coal and Coke Corporation**. Address Gen. Pur. Agt. W. B. Kinkead, The Mine and Smelter Supply Co., Denver, Colo.

1673—Muncie, Ind.—This contract (p. 912), which provides for furnishing the City Government with coal for use at the local Garbage Plant, has been divided between two parties as follows: **C. Taylor**, local agent for the Litz-Smith Fuel Co., of Huntington, W. Va., 4 to 6 cars of Shamrock Island Creek 1½-in. lump at \$2.65 per ton, and the balance to **C. Cranor**, who will furnish Winifred ¾-in. lump at \$2.75 per ton. Address City Clerk, Muncie, Ind.

1682—Crosby, N. D.—This contract (p. 912), which provides for furnishing the local court house, jail and sheriff's office with coal during the year beginning Jan. 1, has been awarded to **T. S. Semington** at \$3.20 per ton for screened coal. Emil Simonet bid \$3.25 per ton. Address County Audr. W. E. Vadnais, Crosby, N. D.

Contract Notes

Belleville, Ill.—The contract for furnishing the County Jail, Farm and Court House with coal during the ensuing year, has been awarded to **Louis Reuther** at \$5.88 per hundred bushels.

Toledo, Ohio—The contract for furnishing the Toledo Railways and Light Co. with approximately 20,000 tons of high-grade West Virginia nut and slack coal, has been awarded to the **Wyatt Coal Co.**

New Britain, Conn.—The requirements of the Beaton & Cadwell Manufacturing Co. (p. 960), have been covered until April of 1916. Address Pur. Agt. W. H. Cadwell, Beaton & Cadwell Mfg. Co., New Britain, Conn.

Auburn, Me.—The contract for furnishing Fitz Bros. at this place with approximately 500 to 800 tons of bituminous coal, has been awarded to **Pulsifer & Young**. The contract runs only to some time in the spring.

Canton, Ohio—The J. C. Niely Co. at this place are desirous of getting in touch with two or three good coal companies in that vicinity. Address Pur. Agt. J. C. Niely, The J. C. Niely Co., 900 3rd St., S. E., Canton, Ohio.

Worcester, Mass.—The General Supply Co. at this place require about 10 cars per month of anthracite and bituminous coal, deliveries being made by railroad. Address J. A. Hubbey, General Supply Co., 134 Exchange St., Worcester, Mass.

Buffalo, N. Y.—The requirements of the Ericsson Mfg. Co. (p. 960), involving approximately 1,200 tons of Youghiogheny three-quarter coal per annum, are covered until Sept. 1 of 1916. Address Pur. Agt. H. R. Dilks, Ericsson Mfg. Co., Buffalo, N. Y.

St. Louis, Mo.—The contract for furnishing Henry Gaus & Sons with approximately 100 tons of lump coal per month, has been awarded to the **Rutledge & Taylor Coal Co.** Address Pur. Agt. J. H. Ahrens, Henry Gaus & Sons, St. Louis, Mo.

St. Louis, Mo.—The contract for furnishing L. P. Bresh & Bro. with approximately 50 tons of lump coal per month was recently awarded to the **Lumaghi Coal Co.** on their "Black Brier" coal. Address Pres. L. P. Bresh, L. P. Bresh & Bro., St. Louis, Mo.

Buffalo, N. Y.—The Buffalo Southern Ry. Co. at this place consume about 3,000 tons of bituminous three-quarter lump per annum, deliveries being made by rail at the rate of about 250 tons per month. Address Pur. Agt. N. A. Bundy, Buffalo Southern Ry. Co., Buffalo, N. Y.

Effingham, Ill.—The contract for furnishing the Mullin-Blackledge-Nellis Co. with about two cars per week of egg coal has been awarded to the **Lumaghi Coal Co.** on their "Cantine" coal. Address Mgr. and Pur. Agt. A. J. Blackledge, Mullin-Blackledge-Nellis Co., Effingham, Ill.

St. Louis, Mo.—The contract for furnishing the St. Louis Paper Can and Tube Co., with about 90 tons of coal per month, has been awarded to the **Polar Wave Ice and Fuel Co.** on Standard 2-in. lump coal. Address Pur. Agt., Kriechenmeister, St. Louis Paper Can and Tube Co., St. Louis, Mo.

St. Louis, Mo.—The contract for furnishing the Commonwealth Steel Co. with approximately 100 tons of 2-in. screenings per day, has been awarded to the **Breese Trenton Coal and Mining Co.** on "Breese" screenings. Address Pur. Agt. Cartan, The Commonwealth Steel Co., St. Louis, Mo.

Highland, Ill.—The contract for furnishing the Lund-Maulding Shoe Co. with its annual fuel requirements, involving approximately 80 tons per month, has been awarded to the **Lumaghi Coal Co.** on their "Cantine" 2-in. lump. Address Pur. Agt. R. L. Lund, Lund-Maulding Shoe Co., Highland, Ill.

Granite City, Ill.—The contract for furnishing the Draper Manufacturing Co. with approximately 80 tons per month of 2-in. screened nut coal, has been awarded to the **Lumaghi Coal Co.** on their "Cantine" coal. Address Pres. and Pur. Agt. C. L. Draper, Draper Manufacturing Co., Granite City, Ill.

St. Louis, Mo.—The contract for furnishing the Columbia Incandescent Lamp Co. with approximately 175 tons of No. 4 washed pea coal during the period from Nov. 1 to May 1, has been awarded to the **Donk Bros. Coal and Coke Co.** Address Mgr. C. A. Dalton, Columbia Incandescent Lamp Co., St. Louis, Mo.

Sandusky, Ohio—The contract for furnishing the Sandusky Gas and Electric Co. with approximately five cars per week of West Virginia ¾-in. lump coal, was recently awarded to **Bert D. Smith** until Apr. 1, 1916. It is understood the coal will come from the Smithers Creek mine of the Sunday Creek Coal Co.

St. Louis, Mo.—The Boehmer Coal Co. will furnish the Union Electric Light and Power Co. with coal until Apr. 1 next. The Light and Power Co. has recently closed important large contracts for furnishing steam and electric power. Address, Pur. Agt. Union Electric Light and Power Co., St. Louis, Mo.

Alton, Ill.—No bids were received for furnishing the Madison County Poor with coal during the coming winter because the appropriation for this purpose has been exhausted. The orders will be distributed among local dealers who will have to carry their bills over until next spring. Address Postmaster Hermann, Alton, Ill.

St. Louis, Mo.—The contract for furnishing the Williams Patent Crusher and Pulverizer Co. with approximately 90 tons of Herrin No. 7 coal per month (p. 960), was awarded at \$1.35 per ton. The contract expires in September of next year. Address Pur. Agt. W. J. Hanson, Williams Patent Crusher and Pulverizer Co., St. Louis, Mo.

St. Louis, Mo.—The contract for furnishing the Manchester Ave. Plant of the National Lead Co., with approximately 500 tons per month of 1½-in. screenings, has been awarded to the **Big Muddy Coal and Iron Co.**; the Collier plant will purchase its supply in the open market. Address Pur. Agt. W. M. Lowery, National Lead Co., St. Louis, Mo.

St. Louis, Mo.—The contract for furnishing the Wm. Waltke Soap Co. with approximately 125 tons per week of 2-in. screened nut coal has been awarded to the **Haddaway Curd Coal Co.** which is shut down temporarily, and the contract is being filled by the Northern Coal Co. Address Pres. and Pur. Agt. Wm. Waltke, Wm. Waltke Soap Co., St. Louis, Mo.

Louisville, Ky.—The Central Coal and Iron Co. concluded a five-year contract covering their annual fuel requirements involving from 1,000 to 1,200 tons of pea and slack coal in June of this year. Deliveries are made by wagon at the rate of 85 to 100 tons per month. Address Pur. Agt. P. M. O'Reilly, Central Coal and Iron Co., 4th and Market St., Louisville, Ky.

Rome, Italy—The sailing of the steamship "Kaupanger" from Philadelphia recently with 2,400 tons of anthracite, and 1,500 tons of coke for Genoa marked the inauguration of a new coal service with Italy. It is reported that many cities in Italy are suffering acutely from the lack of coal. The shortage is particularly serious in Trieste, where the price of illuminating gas has advanced considerably.

St. Louis, Mo.—The contract for furnishing the Mississippi Glass Co. with its annual requirements of coal involving approximately 120 tons per day of Carterville No. 1 washed nut for gas producer use, has been awarded to the **Peabody Coal Co.** at a price understood to be \$1.25 per ton f.o.b. cars at washer. This coal carries a freight rate of 72½c. per ton. Address Pur. Agt. E. Wallace, Mississippi Glass Co., St. Louis, Mo.

St. Louis, Mo.—The contract for furnishing the St. Louis Screw Co. with its annual fuel requirements involving approximately 1,500 tons of No. 5 unwashed slack per month, has been awarded to the **Berry-Bergs Coal Co.** while the boiler requirements of the company, amounting to approximately 200 tons of No. 4 washed pea and No. 3 washed nut per month, was awarded to the **Donk Bros. Coal and Coke Co.** Address Gen. Mgr. C. P. Burgess, St. Louis Screw Co., St. Louis, Mo.

Denver, Colo.—The Denver Gas and Electric Co. have a contract with the **Cedar Hill Coal and Coke Co.** for furnishing the fuel requirements at their gas plant, involving approximately 250 tons per day, which runs for three years. The contract for supplying the power plant with approximately 200 tons per day expires in about a year and a half, and is held by the **Rocky Mountain Fuel Co.** Address Vice-Pres. and Gen. Mgr. W. J. Barker, Denver Gas and Electric Light Co., Gas and Electric Bldg., Denver, Colo.